MODEL 633A

FREQUENCY SYNTHESIZER

VOL. (Three of three)

MONTRONICS, INC.
Subsidiary of John Fluke Mfg. Co., Inc.
Seattle, Washington 98133

P. O. Box 7428 Telephone: 206-776-3141 TWX: 910-449-2852

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10:1 DIVIDER

MODULE ALIGNMENT

a. Remove the screws from the metal enclosure cover thus exposing the land pattern side of the printed circuit board. Install in its place a test cover to secure the circuit board during alignment.

b. Before applying dc power to the module, preset R21 to midscale. Connect a dc differential voltmeter between TP3 and TP4.

c. Apply -12 volts dc and ground to the feed-thru terminals on the metal enclosure.

d. Adjust R21 to set regulator voltage to 5.10 volts ±50 millivolts.

e. Connect a 50-ohm load to the output connector (J1).

f. Connect a 25 MHz signal source at a level of 40 millivolts to the input (J2).

g. Connect the rms voltmeter to TP1. Adjust T1 for maximum voltage level.

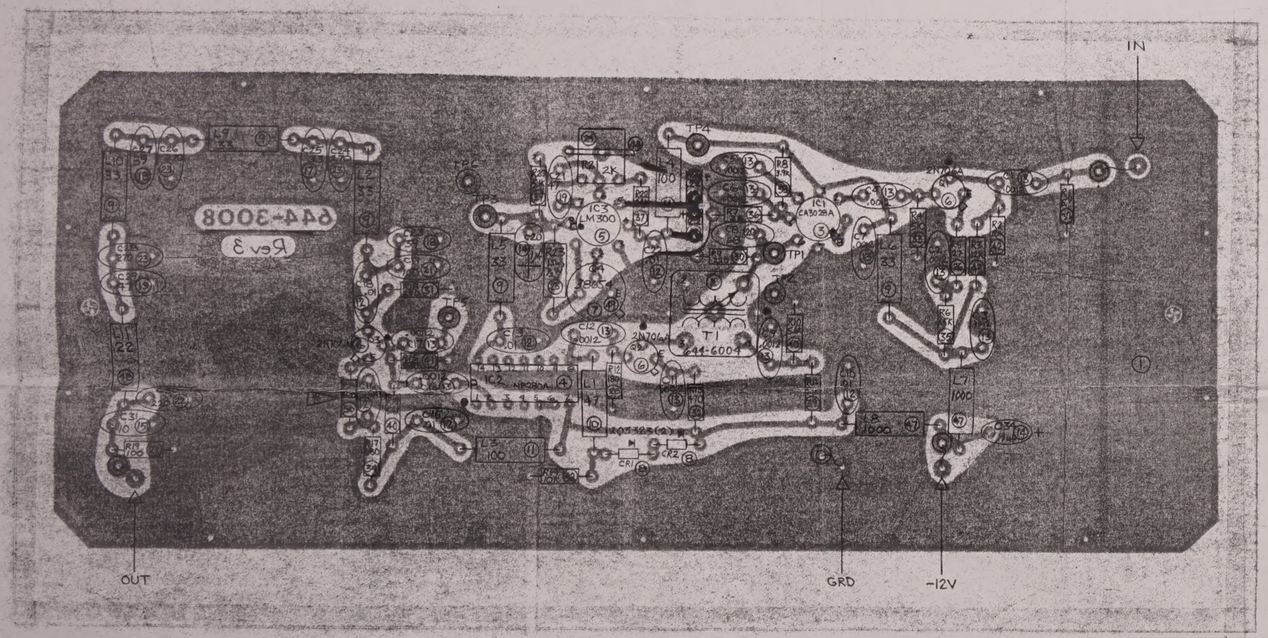
h. Connect the rms voltmeter in parallel with a 50-ohm load to the output connector, (J1).

i. Manually tune the input frequency from 20 to 30 MHz. Check for 60 millivolts ±2 db across the band.

j. Connect the frequency counter to the output terminal (J1). Verify proper 10:1 divider action over the frequency band 20 to 30 MHz.

k. Remove all test equipment from the 10:1 Divider Module.

ITEM	P N	NOMENCLATURE	REF	QTY
48	147893	INDUCTOR 22uh	L-11	1
49	152207	TRANSIPAD (TO 5)	—"—	1
50	221903	RES. 1/4W 5% 620Ω	R24	1



NOTES: 1 C10, C13, C15, C16, C18, C22
2 C1, C2, C3, C4, C5, C6, C7, C9, C11, C12, C14, C17

(●) DOT INDICATES CLOCKING.

FACTORY SELECT 620Ω NOMINAL VALUE

644-4008 REV 6 SH OF

ITEM	P/N	NOMENCLATURE	REF	QTY
1	251082	PCB FAB 644-3008	---	1
2	254169	TRANSFORMER 644-6004	T1	1
3	221258	INTEGRATED CIRCUIT CA3028A	IC1	1
4	221241	" NE592A	IC2	1
5	221233	" LM300	IC3	1
6	148703	TRANSISTOR 2N706A	Q1,2,3	3
7	218537	" 38654	Q4	1
8	203323	DIODE	CR1,2	2
9	249068	INDUCTOR 33uh	L2,5,6,9,10	5
10	249044	" 47uh	L1	1
11	249102	" 100uh	L3,4	2
12	149153	CAPACITOR - CERAMIC .01uf	1	6
13	106732	" " .0012uf	2	1
14	161919	" - TANTALUM 1uf	C20,34	2
15	175216	" - D.M. 100pf	C31	1
16	177451	" " 82pf	C28	1
17	160317	" " 33pf	C25	1
18	148544	" " 39pf	C23,C27	2
19	148536	" " 47pf	C21,C29	2
20	148510	" " 68pf	C8	1
21	148494	" " 100pf	C19	1
22	170423	" " 220pf	C30	1
23	148452	" " 270pf	C24,26,28	3
24	208330	RESISTOR - VARIABLE 2KΩ	R31	1
25	218693	" - 1/2W 5% 1Ω	R23	1
26	160812	" - 1/4W 5% 27Ω	R5	1
27	147926	" " 100Ω	R20	1
28	147934	" " 150Ω	R21	1
29	147942	" " 220Ω	R22	1
30	147959	" " 330Ω	R11	1
31	147975	" " 390Ω	R18	1
32	147983	" " 470Ω	R16	1
33	218032	" " 510Ω	R4	1
34	148007	" " 680Ω	R17	1
35	148031	" " 1.5KΩ	R6	1
36	202879	" " 2KΩ	R7	1
37	193433	" " 2.4KΩ	R29	1
38	148064	" " 3.3KΩ	R8	1
39	193342	" " 5.1KΩ	R10,12	2
40	148080	" " 5.6KΩ	R13,14	2
41	148098	" " 6.8Ω	R9	1
42	148106	" " 10KΩ	R3,15	2
43	159731	" " 12KΩ	R1	1
44	104714	MOUSE TAIL	---	1
45	161331	CAPACITOR - TANT .22uf	C33	1
46	161927	" " 2.2uf	C32	1
47	222166	" " 47uf	L7	2

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
E6 D1	6	ITEM 2 WAS 644-4004	PC 7-19-71		
—	5	RELEASE	PC 7-19		
C8 C7	5	C27 WAS 82pf, C29 WAS 12pf R24 WAS 470Ω & L11 WAS 33uh	PC 7-19		
	4	ADDED REV 3 TO ART WORK	PC 7-19		
C5	3	DELETED (1) ITEM 24 & ADDED (1) ITEM 32	LL		
C-5	2	DELETED (1) ITEM 32 & ADDED (1) ITEM 29	LL		
—	1	REVISED			

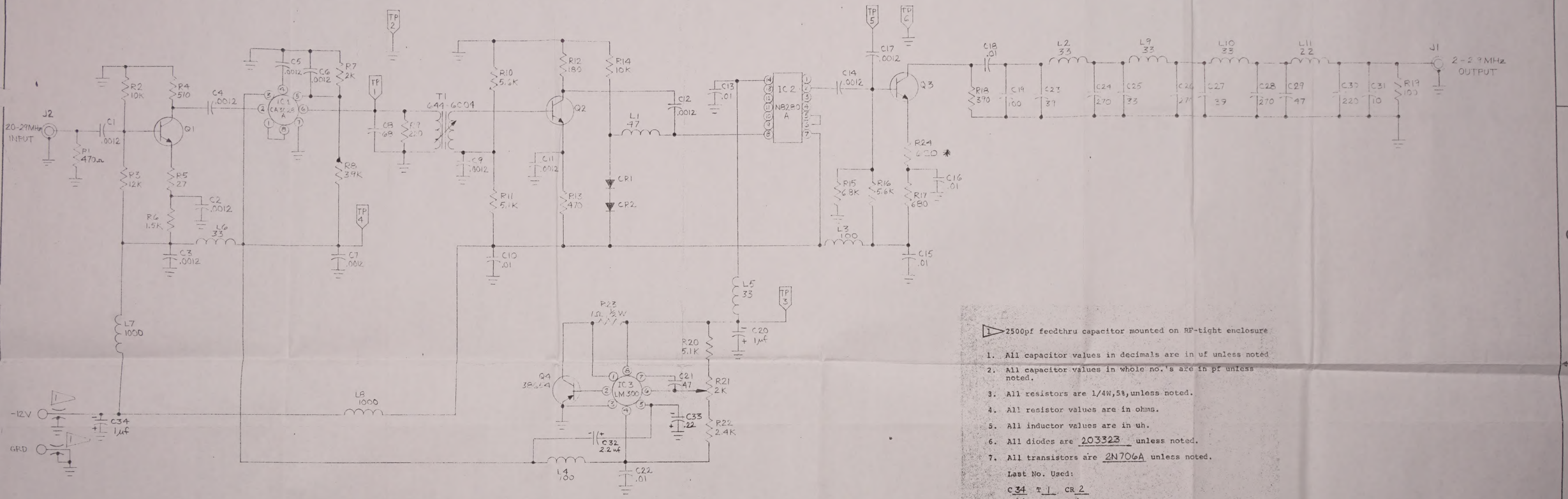
FLUKE	JOHN FLUKE MFG CO., INC. P.O. BOX 7428, SEATTLE, WN.
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES	
3 PLACE DECIMALS ± .010	
2 PLACE DECIMALS ± .02	
FRACTIONS ±	
ANGLES ± X CONST.	
DO NOT SCALE DRAWING	
DFTM L. THOMPSON 6-27-71	
PROJ ENG	
MFG ENG 7-6-71	
MATERIAL:	
FINISH:	

D/A DIVIDER COMPONENT ASSY

PART NO	SIZE	DRAWING NUMBER
251348	D	644-4008
SCALE	SHEET — OF —	REV 6

DIST

644-1008 SH 1 OF 1 REV 4



1 2500pf feedthru capacitor mounted on RF-tight enclosure

1. All capacitor values in decimals are in uf unless noted
2. All capacitor values in whole no.'s are in pf unless noted.
3. All resistors are 1/4W, 5%, unless noted.
4. All resistor values are in ohms.
5. All inductor values are in uh.
6. All diodes are 203323 unless noted.
7. All transistors are 2N706A unless noted.

Last No. Used:

C 34 T 1 CR 2
R 24 L 11 Q 4
IC 3

* NOMINAL VALUE - FACTORY SELECT

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
	4	SPECIAL RELEASE	LL		
	4	ADDED NOM. VALUE TO R24 WAS 470Ω. L11 WAS 33 **C29 WAS 12	LL		
	3	R1 WAS 33K	LL		
	2	R1 WAS 470Ω	LL		
	1	REVISED			

FLUKE JOHN FLUKE MFG CO., INC. P.O. BOX 7428 SEATTLE WN.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES
3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ± —
ANGLES ± — X CONST. —

DO NOT SCALE DRAWING
DFTM GAIL OCHS 5-27-68
PROJ ENG 7-1-68
MFG ENG 7-26-68
MATERIAL: —
FINISH: —

10/1 DIVIDER (SCHEMATIC)

PART NO	SIZE	DRAWING NUMBER
	D	644-1008

SCALE — SHEET 1 OF 1 REV 4

DIST

DUAL 10:1 DIVIDER

MODULE ALIGNMENT

a. Remove the screws from the metal enclosure cover, thus exposing the land pattern side of the printed circuit board. Install in its place a test cover to secure the circuit board during alignment.

b. Before applying dc power to the module, preset R16 to midscale. Connect a dc differential voltmeter between TP3 and the -12 volt supply terminal.

c. Apply -12 volts dc and ground to the feed-thru terminals on the metal enclosure.

d. Adjust R16 to set regulator voltage to 5.10 volts ±50 millivolts.

e. Connect a 50-ohm load to the output connector of Channel A (J2).

f. Connect a 25 MHz signal source at a level of 40 millivolts to Channel A input (J4).

g. Connect the rms voltmeter to TP1. Adjust T1 for maximum voltage level.

h. Connect the rms voltmeter in parallel with a 50-ohm load to the Channel A output connector, (J2). Adjust L5 and T2 for maximum output.

i. Manually tune the input frequency from 20 to 30 MHz. Fine-tune L5 and T2 to level the output over this band.

j. Connect the frequency counter to the output terminal (J2). Verify proper 10:1 divider action over the frequency band 20 to 30 MHz.

k. Remove test equipment from Channel A connectors. Connect a 50-ohm load to Channel B output, (J1).

l. Connect a 25 MHz signal source at a level of 40 millivolts to Channel B input (J3).

m. Connect the rms voltmeter to TP5. Adjust T3 for maximum voltage level.

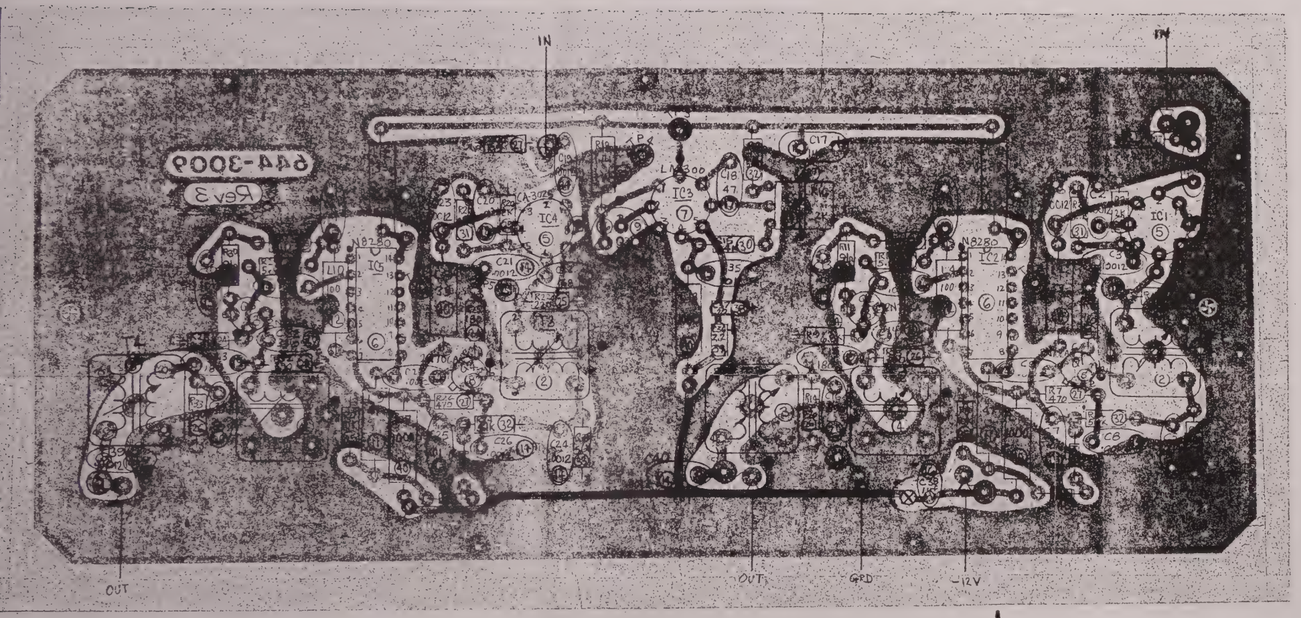
n. Connect the rms voltmeter in parallel with a 50-ohm load to the Channel B output connector, (J1). Adjust L11 and T4 for maximum output.

o. Manually tune the input frequency from 20 to 30 MHz. Fine-tune L11 and T4 to level the output over this band.

p. Connect the frequency counter to the output terminal (J1). Verify proper 10:1 divider action over the frequency band 20 to 30 MHz.

q. Remove all test equipment from the Dual 10:1 Divider.

644-4009 REV 3 SH - OF -



NOTES:

1. C1,C2,C3,C5,C6,C8,C9,C11,C19,C20,C21,C23,C24,C26,C27, C29, C39, C40
2. C7,C10,C12,C13,C25,C28,C30,C31,C35
3. ⊗SOLDER FEEDTHRU WIRES (BOTH SIDES) BEFORE INSTALLING COMPONENTS
4. ● - DOT INDICATES CLOCKING

ITEM	P/N	NOMENCLATURE	REF	QTY
1	251090	PCB FAB 644-3009	---	1
2	254169	TRANSFORMER ~~644-6004~~	T1,3	2
3	204926	" 314-614	T2,4	2
4	204941	COIL 314-616	L5,11	2
5	246256	INTEGRATED CIRCUIT CA3028A	IC1,4	2
6	248076	" " N8280A	IC2,5	2
7	218232	" " LM300	IC3	1
8	148593	TRANSISTOR 2N706A	Q1,2,4,5	4
9	218537	" 38654	Q3	1
10	247086	INDUCTOR 33uh	L2,6,8,12	4
11	247087	" 47uh	L3,9	2
12	247102	" 100uh	L4,10	2
13	203323	DIODE	CR1 → CR4	4
14	106732	CAPACITOR - CERAMIC.0012uf	1	15
15	149153	" " .01uf	2	9
16	161919	" - TANTALUM 1uf	C17,38	2
17	148536	" - D.M. 47pf	C18	1
18	148510	" " 68pf	C4,22	2
19	148460	" " 180pf	C15,33	2
20	148445	" " 330pf	C14,16,32,34	4
21	208330	RESISTOR -VARIABLE 2KΩ	R16	1
22	218692	" - 1/2W 5% 1Ω	R18	1
23	~~221887~~ 221891	" - 1/4W 5% ~~51Ω~~ 47Ω	R11,30	2
24	147942	" " " 180Ω	R6,25	2
25	147959	" " " 220Ω	R4,R22	2
26	147975	" " " 390Ω	R13,14,32,33	4
27	147983	" " " 470Ω	R5,29,7,26	4
28	218032	" ~~1/4W~~ 5% 510Ω	R12	1
29	218099	" " " 1KΩ	R2,19	2
30	193437	" " " 2.4KΩ	R15	1
31	148064	" " " 2.9KΩ	R31,21	2
32	193342	" " " 5.1KΩ	R17,24,34	3
33	148030	" " " 5.6KΩ	R5,10,23,28	4
34	148098	" " " 6.8KΩ	R9,28	2
35	148106	" " " 10KΩ	R8,27	2
36	152207	TRANSIPAD -TO-5	---	1
37	148064	" " " 2.9KΩ	---	1
38	161331	CAPACITOR - TANT. .22uf	C37	1
39	161727	" " 2.2uf	C36	1
40	256107	INDUCTOR 1000 uh	L1,7,13	3

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
—	3	PRODUCTION RELEASE	PE 7/7/9		
CB	3	ADDED REV 3 TO ARTWORK	PE 7/7/9		
CB CG	2	CHANGED VALUES R11, R30 FROM 33Ω TO 47Ω	CG 6-5-8		
	1	REVISED			

FLUKE JOHN FLUKE MFG CO., INC. P.O. BOX 7428, SEATTLE, WN.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES

3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

DO NOT SCALE DRAWING

DFTM K. THOMPSON 6-26-8
PROJ ENG [illegible] 7-
MFG ENG [illegible] 7-6-8

MATERIAL: —

FINISH: —

DUAL 10/1 DIVIDER (COMPONENT ASSEMBLY)

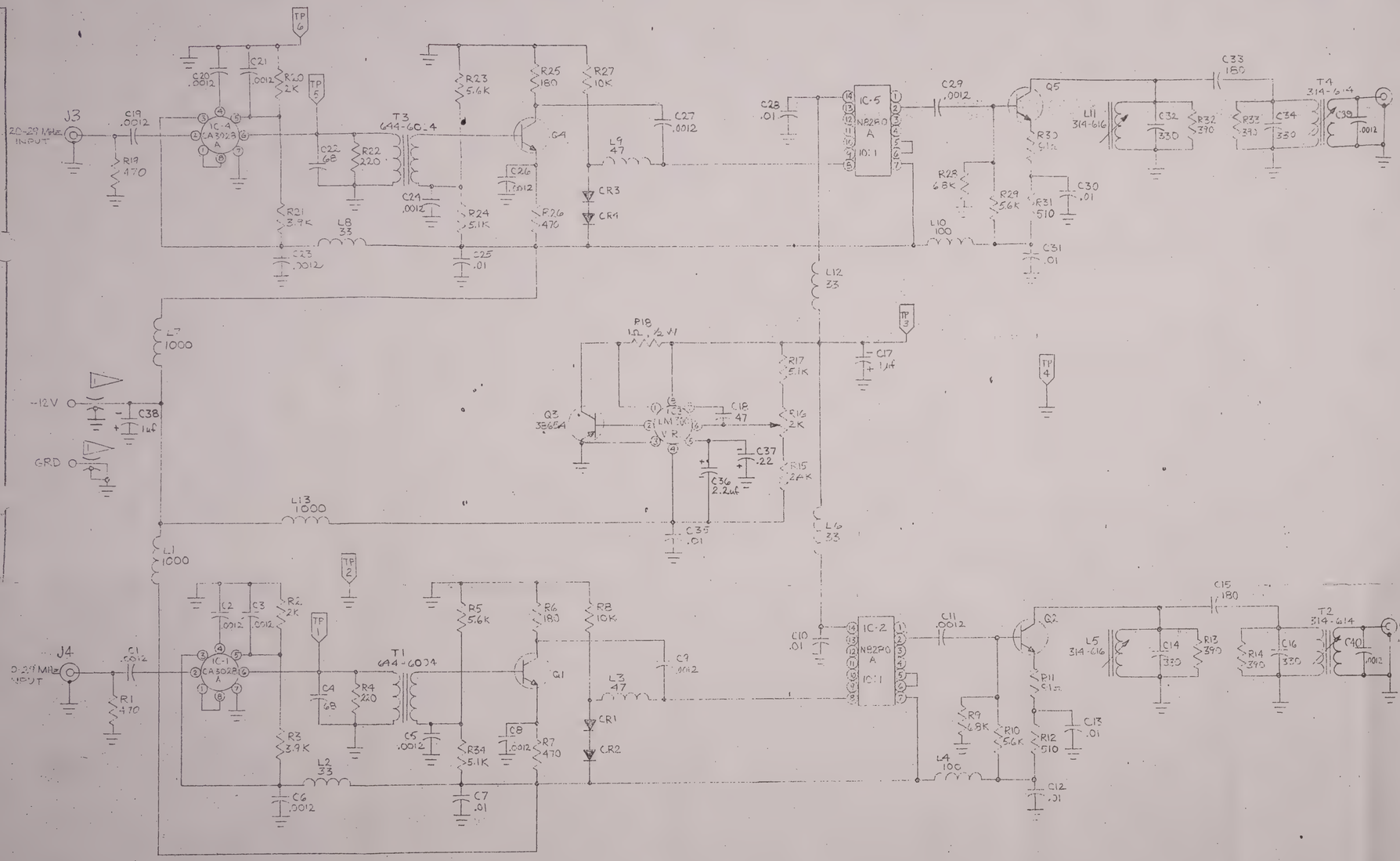
PART NO	SIZE	DRAWING NUMBER
251355	D	644-4009

SCALE 2X SHEET — OF — REV 3

DIST 965

ORDG.

644-1009
SH 1 OF 1 REV 2



NOTES:

1. 2500pf feedthru capacitor mounted on RF-tight enclosure
2. All capacitor values in decimals are in uf unless noted
3. All capacitor values in whole no.'s are in pf unless noted.
4. All resistors are 1/4W,5%,unless noted.
5. All resistor values are in ohms.
6. All inductor values are in uh.
7. All diodes are 203323 ~~unless noted.~~
8. All transistors are 2N706A unless noted.

Last No. Used:

C40 T 4 CR 4 IC 5
R 33 L 13 Q 5

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
	2	PRODUCTION RELEASE	CFC 4/23/74	BS 4/23/74	
	2	CHANGED VALUES R16 R15 FROM 2.2K	E.S.S.		
	1	REVISED			

FLUKE JOHN FLUKE MFG CO., INC. P.O. BOX 7428, SEATTLE, WN.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES

3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ± ——
ANGLES ± —— X CONST. ——

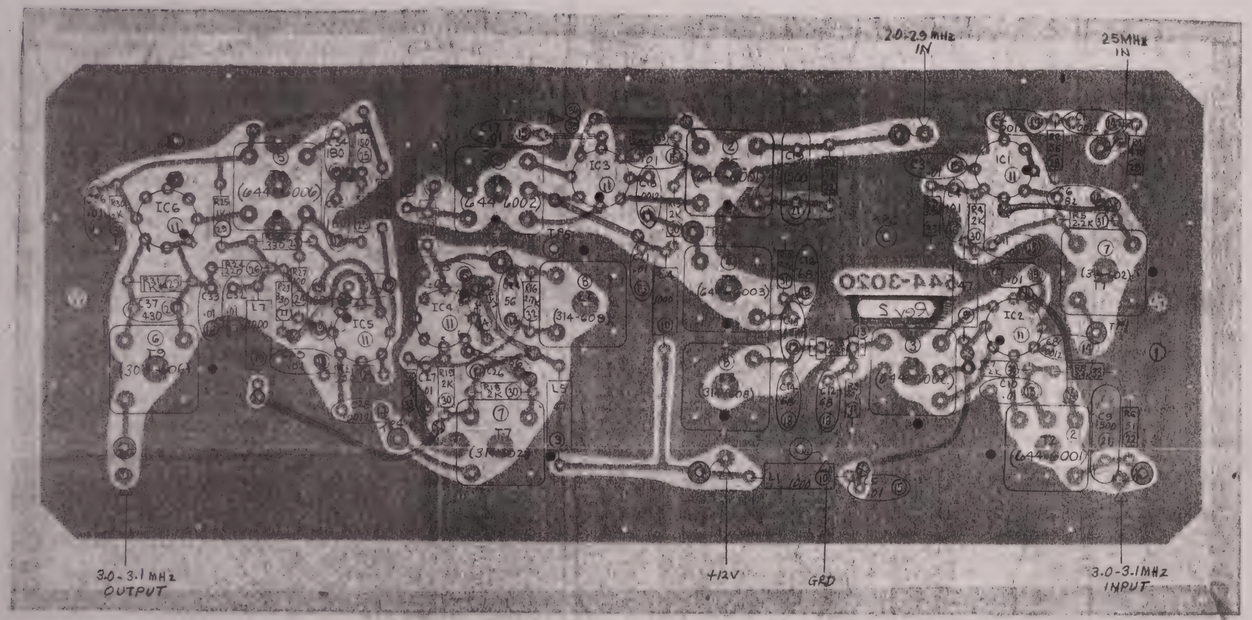
DO NOT SCALE DRAWING

DFTM GAIL OCHS 5-7-74
PROJ ENG [illegible] 4/23/74
MFG ENG [illegible] 4/23/74
MATERIAL: ——
FINISH: ——

DUAL 10:1 DIVIDER (SCHEMATIC)

PART NO	SIZE	DRAWING NUMBER
	D	644-1009
SCALE ——	SHEET 1 OF 1	REV 2

DIST 26



NOTES:
1. C3,C4,C5,C7,C10,C11,C17,C20,C21,C25,C27,C29,C32,C33,C36
2. R4,R13,R18,R19,R30, R7
- ● - DOT INDICATES IC & XFMR CLOCKING
- ⊗ - SOLDER FEEDTHRU WIRES (BOTH SIDES) BEFORE INSTALLING COMPONENTS (22 PL)
3. SLEEVE ITEM (35) JUMPER WIRE WITH (36) SLEEVING, TEF # 18
- * - FACTORY SELECT COMPONENT, NOMINAL VALUE SHOWN.

644-4020 SH 1 OF 1 REV S

ITEM	P/N	NOMENCLATURE	REF	QTY
		(644-5011)		
		(644-6002)		
		(644-6003)		
	256185	" (644-6006)		
	240094			
	256107	" 1000pf		
		INTEGRATED CKT CA3028A		
	178473	CAPACITOR-CER 1.5 pf	C15	1
	106625	" " 2.2 pf	C23, C13	2
	106732	" " .0012 uf	C1,C2,C8,C18,C28	5
	149344	" " .01 uf	▷	4
	145052	" " 82 pf	C6	1
	140528	" " 56 pf	C22, C24, C26	3
	148213	" " 68 pf	C12, C14, C16	3
	143980	" " 130 pf	C30,C31,C34,C35	4
	147940	" " 430 pf	C37	1
	148061	" " 1500 pf	C9, C19	2
	221879	RESISTOR 1/4		2
	147900	"		1
	147926	"		
	147934	"		
	147950	"		1
			▷	
	144949	" " " 2.2K	R3, R9, R11	
	147975	" " " 2.7K	R15, R16	
	146964	" " " 3.9K	R5,R8,R14,	
5	115469			1"
6	175	T&R #19		

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
C8	5	E.O.3413 R3, WAS 147884			
—	4	PRODUCTION RELEASE	PC		
B6 C4	4	ADDED ITEM 36 & NOTE 3			
—	3	ADDED REV J TO ARTWORK			
C7	2	RELEASED WITH ITEM 27			
—	1	REVISED			

FLUKE JOHN FLUKE MFG CO., INC. P.O. BOX 7428, SEATTLE, WN.

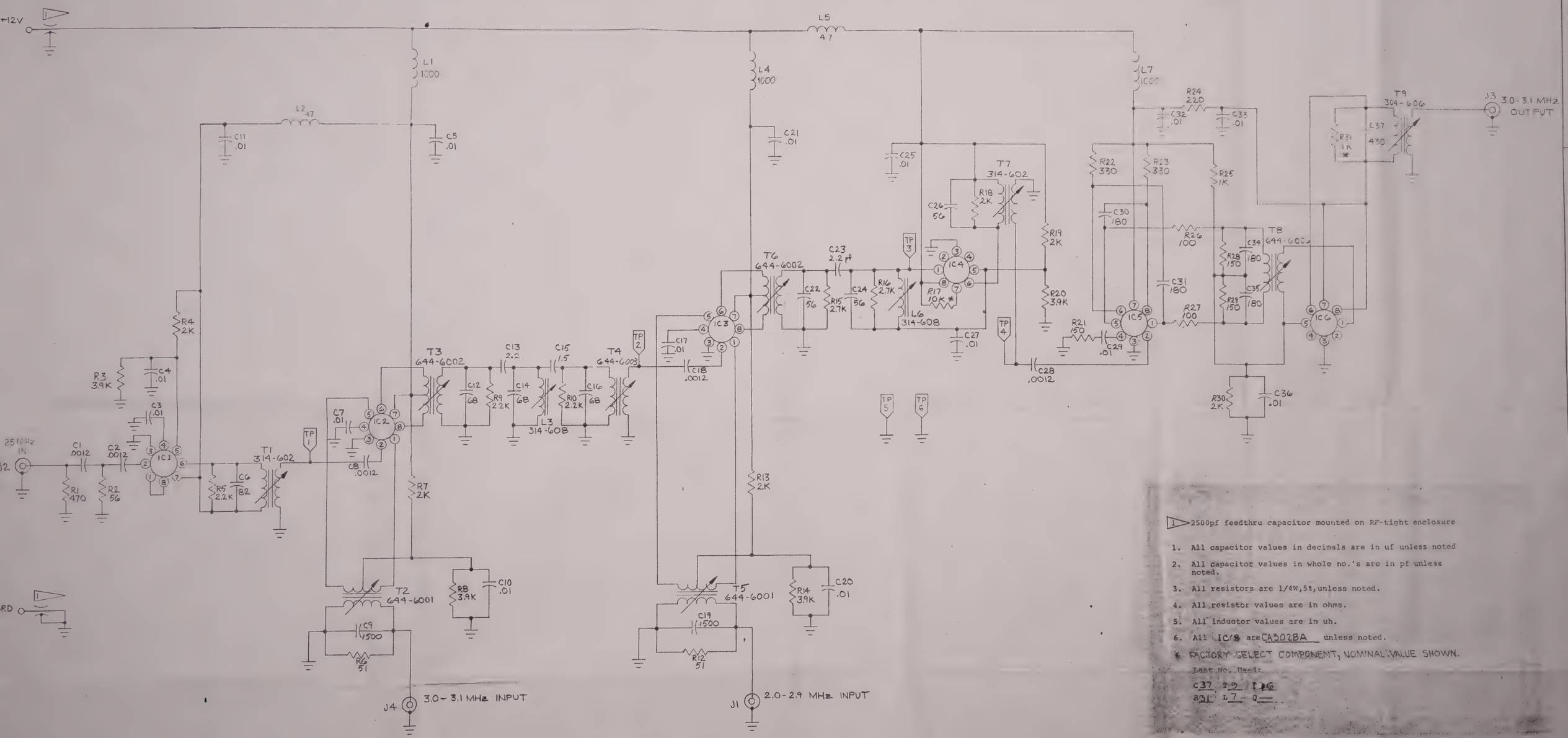
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES
3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

DO NOT SCALE DRAWING
DFTM Ray Thompson 8-20-8
PROJ ENG 7-7-8
MFG ENG 3-6-09
MATERIAL: —
FINISH: —

DIGIT UNIT
(COMPONENT ASSY)

PART NO	SIZE	DRAWING NUMBER
253617	D	644-4020
SCALE 2X	SHEET 1 OF 1	REV S

DIST



1 2500pf feedthru capacitor mounted on RF-tight enclosure

1. All capacitor values in decimals are in uf unless noted
2. All capacitor values in whole no.'s are in pf unless noted.
3. All resistors are 1/4W, 5%, unless noted.
4. All resistor values are in ohms.
5. All inductor values are in uh.
6. All IC's are CA3028A unless noted.

* FACTORY SELECT COMPONENT, NOMINAL VALUE SHOWN.

Last No. Used:

C 37 T 9 IC 6

R 31 L 7 Q —

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
C2	3	ECO 3413 PC LYNX-1100			
—	2	PRODUCTION RELEASE			
C5	2	RELEASED FOR PRODUCTION			
—	1	REVISED			

FLUKE JOHN FLUKE MFG CO., INC. P.O. BOX 7428, SEATTLE, WN.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES

3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

DO NOT SCALE DRAWING

DFTM GAIL OCHS 8-7-68
PROJ ENG
MFG ENG

MATERIAL:
FINISH:

DIGIT UNIT (SCHEMATIC)

PART NO	SIZE	DRAWING NUMBER
—	D	644-1020

SCALE — SHEET 1 OF 1 REV

MODULE ALIGNMENT

a. The electronic circuitry on the front control circuit board can be aligned with the board mounted in the instrument. To gain access to test points and adjustments, remove the top and bottom covers of the instrument, and the extruded trim strips in front.

b. Connect an oscilloscope to the sweep output at J2 on the [illegible] board. J2 is a pin type connector on the top side of the board and it is the one located closest to the center of the board.

c. Make the following initial control settings on the control section subpanel.

Unlabeled SEARCH DIGIT INTERPOLATOR	-	SWEEP
Sweep Time	-	.01 Sec.
Sweep Width	-	X1
Synthesizer Local/Remote	-	Local

d. Adjust R3 to set the triangle waveform amplitude to 20 volts peak-to-peak. The triangle generator may not be operating if R3 has been set to its maximum position. The generator should start as R3 is adjusted toward center.

e. Check that the triangle wave period is 20 milliseconds ±25%. Rotate S11 C.C.W., observing that the sweep generator operates correctly at lower speeds. You should observe the following periods for one-way sweeps. They should all be accurate within ±25%.

Switch Position	Total Sweep Period
.01	20 milliseconds
.02	40 "
.05	100 "
.1	200 "
.2	400 "

Switch Position	Total Sweep Period
.5	1 second
1.0	2 "
2.0	4 "
5.0	10 "
10.0	20 "
20.0	40 "
50.0	100 "

On the slow sweeps, let the oscilloscope free-run fast enough so that a steady line is displayed on the CRT. Use ac coupling and increase vertical sensitivity so that the triangle end points are indicated by a sudden movement of the oscilloscope display. Measure the sweep period by observing time between transistions with the stop watch.

f. Remove the oscilloscope connection from J2.

g. The Digit Interpolator dial may be calibrated by adjusting R15 and R17 which are located on the bottom of the board. Refer to Section III of this manual for directions.

ITEM	P/N	NOMENCLATURE	REF	QTY
1	251132	PCB FAB 644 [illegible]	—	1
2	240607	INTEGRATED CIRCUIT 709C	IC1,5	2
3	245773	" CA3027	IC3	1
4	215897	TRANSISTOR 2N4126	Q1 → Q7	7
5	149187	DIODE IN270	CR1 → CR20	20
6	175272	CAPACITOR-CERAMIC .005µf	C7	1
7	179277	" " .68µf	C9,10,11,12	4
8	175059	" -ELEC. 100µf/15V	C5,6	2
9	184366	" -FILM .47µf	C4	1
10	161919	" -TANT 1µf	C1,3	2
11	160259	" " 10µf/20V	C13	1
12	175216	" -D.M. 10pf	C2	1
13	148460	" " 180pf	C8	1
14	203836	RESISTOR-VAR. 1KΩ	R15,17	2
15	113191	" " 2KΩ	R3	1
16	148023	" -¼W 5% 1KΩ	R27	1
17	148031	" " " 1.5KΩ	R13	1
18	202879	" " " 2KΩ	R28	1
19	197508	" " " 3KΩ	R24	1
20	148056	" " " 33KΩ	R2	1
21	193375	" " " 4.3KΩ	R4	1
22	193342	" " " 5.1KΩ	R1,24	2
23	148098	" " " 6.8KΩ	R5	1
24	148106	" " " 10KΩ	R26	1
25	221606	" " " 16KΩ	R7	1
26	148130	" " " 22KΩ	R9 → R35	7
27	197417	" " " 30KΩ	R20,21	2
28	148171	" " " 33KΩ	R	1

ITEM	P/N	NOMENCLATURE	REF	QTY
29	185415	RESISTOR ¼W 5% 82Ω	R8	1
30	193412	" " 1K	R4	1
31	150212	" " 1.5K	R7	
32	193441	" " 150Ω	R18,19	2
33	248791	" " 200Ω	R23	1
34	192118	" " 330Ω	R10	
35	220541	" " " 820Ω	R11	1
36	194941	" " " 1.0MΩ	R12	1
37	253633	PC BOARD, MULTILAYER	CR21	1

NOTES

1. (●) INDICATES CLOCKING, TRANSISTOR BASE
2. ⊗- SOLDER FEED-THRU WIRES (BOTH SIDES) BEFORE INSTALLING COMPONENTS (73 PL)
3. ALL DIODES ARE IN270

644-4022
SH 1 OF 2 REV 2

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
—	2	[illegible] RELEASE	[illegible]	[illegible]	[illegible]
—	2	ADDED ITEM 37	[illegible]	[illegible]	[illegible]
—	1	REVISED	[illegible]	[illegible]	[illegible]

FLUKE JOHN FLUKE MFG CO., INC.
P.O. BOX 7428, SEATTLE, WN.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES
3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

DO NOT SCALE DRAWING
DFTM GAIL OCHS 10-29-68
PROJ ENG [illegible] [illegible]
MFG ENG [illegible] 3-19-69
MATERIAL: —
FINISH: —

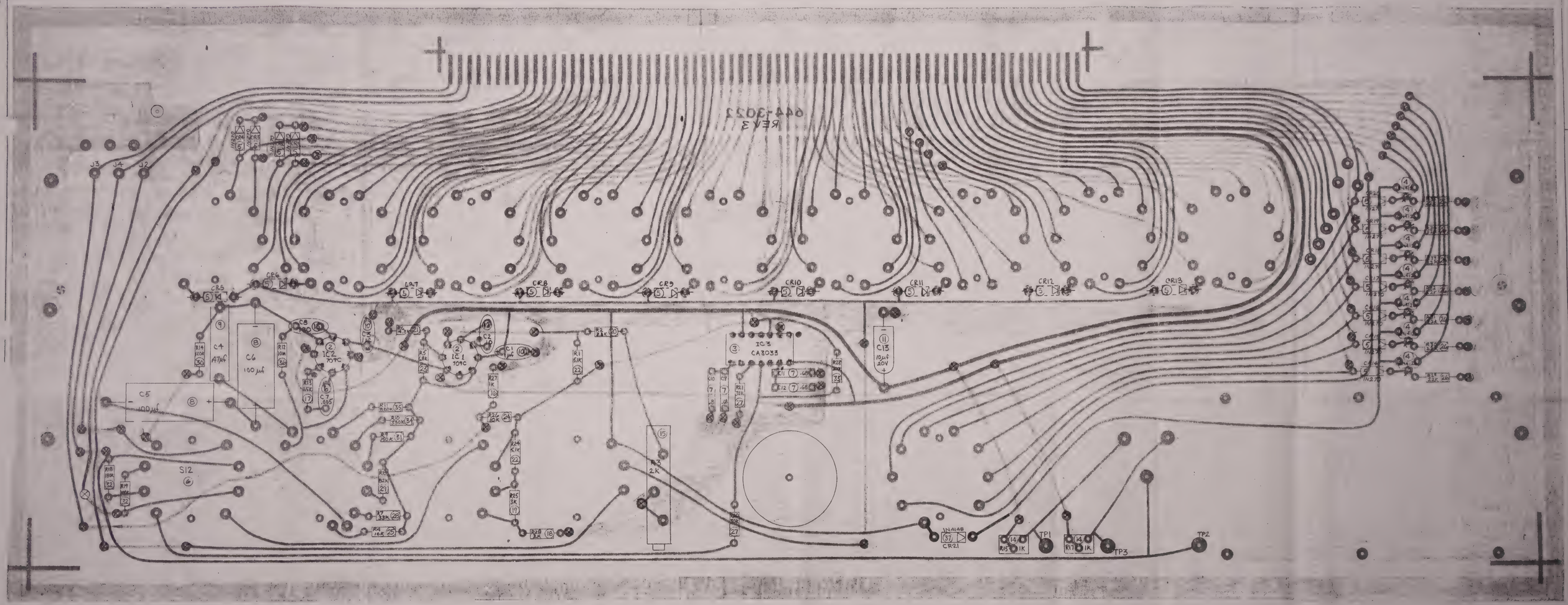
FRONT CONTROLS COMPONENT ASSEMBLY

PART NO	SIZE	DRAWING NUMBER
253633	C	644-4022

SCALE NONE SHEET 1 OF 2 REV 2

DIST [illegible]

644-4022
SH 2 OF 2 REV 2.



ZONE	REV	DESCRIPTION	DWN	CKD	APPD
	2	[illegible]			
B-4		[illegible]			
—	1	REVISED			

FLUKE JOHN FLUKE MFG CO., INC. P.O.BOX 7428 SEATTLE, WN.	DO NOT SCALE DRAWING	FRONT CONTROLS (COMPONENT ASSEMBLY)
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES	DFTM GAIL OCHS 7-29-68	
3 PLACE DECIMALS ± .010	PROJ ENG	
2 PLACE DECIMALS ± .02	MFG ENG [illegible] 7-31-68	
FRACTIONS ±	MATERIAL —	PART NO 253633 SIZE D DRAWING NUMBER 644-4022
ANGLES ± X CONST.	FINISH —	SCALE 2X SHEET 2 OF 2 REV

MODULE ALIGNMENT

a. Remove the screws from the module enclosure cover and remove the cover from the module, thus exposing the land-pattern side of the printed circuit board. Replace the screws using spacers to provide rf grounding of the printed circuit board.

b. Apply ±12.5 volts dc and ground to the appropriate feed-through connectors.

c. Connect the frequency counter and 50-ohm load to the output connector using the fee connector supplied in the accessory kit. The frequency counter should indicate approximately 3 MHz.

d. Apply -2.5 volts dc to TP1 and adjust R40 for a frequency counter indication of 2.9 MHz ±200 Hz. The resolution of R40 limits the setting of this step to as close as reasonably possible.

NOTE!

Applied input voltages specified are to be ±5 millivolts unless otherwise noted.

e. Apply +2.5 volts dc to TP1 and adjust C8 for a frequency counter indication of 3.1 MHz ±200 Hz.

f. Repeat steps d and e until both frequencies versus applied voltages are correct.

g. Disconnect the voltage applied to TP1 and connect the variable voltage source to the module control voltage input connector.

h. Connect a jumper cable from TP6 to TP2 and apply +10 volts dc to the control voltage input connector.

i. Adjust R1 for a frequency counter indication of 3099.55 kHz ±100 Hz.

j. Change the dc control voltage to +7.5 volts dc and observe the frequency counter deviation above or below 3075 kHz. Adjust R2 for a frequency counter indication of 3075 kHz + four times the deviation noted.

EXAMPLE!

With +7.5 volts dc applied, the frequency counter indicates 3074.56 kHz. The deviation noted would be -0.44 kHz. R2 would then be adjusted until the frequency counter indicated 3075 + 4(-0.44) or 3073.24 kHz.

k. Repeat steps i and j until the frequency counter indicates 3099.55 kHz ±100 Hz with +10 volts dc applied and 3075 kHz ±100 Hz with +7.5 volts dc applied.

l. Perform the connections and adjustments for the desired frequency counter indications contained in the Figure 1 Linearizing Network Adjustments.

m. Perform the input voltage versus output frequency checks contained in Figure 2, observing that the output frequency is within ±100 Hz on all settings. Should the frequency counter reading exceed ±100 Hz, align the appropriate segment and all following segments until the output frequency is within the ±100 Hz tolerance.

JUMPER WIRE CONNECTION	INPUT VOLTAGE (DC VOLTS)	ADJUSTMENT	FREQUENCY COUNTER READING (±100 HZ)
TP6 to TP3	+ 6.7 volts	R3	3066.55 kHz
TP6 to TP3	+ 3.6 volts	R4	3036. kHz
TP6 to TP4	+ 2.9 volts	R5	3028.55 kHz
TP6 to TP4	- 0.7 volts	R6	2993. kHz
TP6 to TP5	- 1.4 volts	R7	2985.55 kHz
TP6 to TP5	- 5.2 volts	R8	2948. kHz
NONE	- 6.2 volts	R9	2937.55 kHz
NONE	-10 volts	R10	2899.55 kHz

Figure 1. LINEARIZING NETWORK ADJUSTMENTS

INPUT CONTROL VOLTAGE	OUTPUT FREQUENCY	ALIGNMENT STEP AND ADJUSTMENT
+10	3099.55 kHz	Step h thru k R1
+ 7.5	3075. kHz	Step h thru k R2
+ 6.7	3066.55 kHz	Step 1 R3
+ 3.6	3036. kHz	Step 1 R4
+ 2.9	3028.55 kHz	Step 1 R5
- 0.7	2993. kHz	Step 1 R6
- 1.4	2985.55 kHz	Step 1 R7
- 5.2	2948. kHz	Step 1 R8
- 6.2	2937.55 kHz	Step 1 R9
-10	2899.55 kHz	Step 1 R10

Figure 2. INPUT VOLTAGE VERSUS OUTPUT FREQUENCY CHECKS

Figure 2, observing that the output frequency is within ±100 Hz on all settings. Should the frequency counter reading exceed ±100 Hz, align the appropriate segment and all following segments until the output frequency is within the ±100 Hz tolerance.

n. Disable all applied input voltages and replace the module enclosure cover. Reapply all input voltages upon completion of this step.

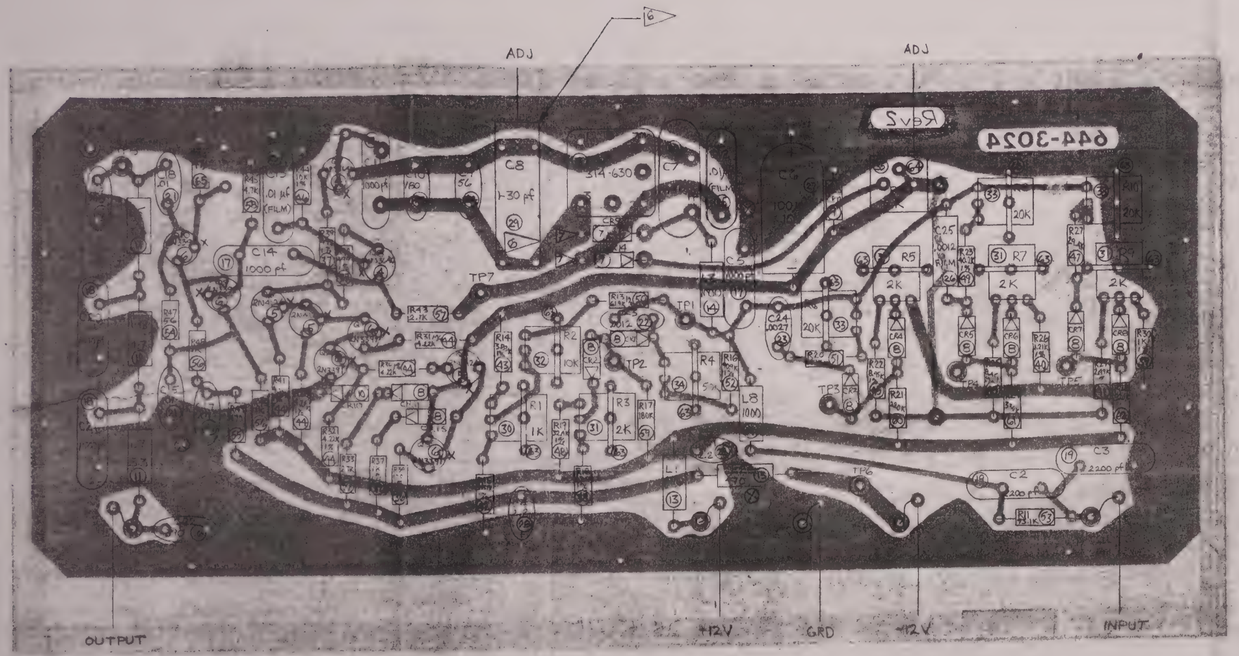
o. Set the dc control voltage to +10 volts and adjust C8 for a frequency counter indication of 3099.55 kHz ±100 Hz.

p. Repeat step m.

q. Disconnect the frequency counter from the module output connector and connect the rms voltmeter. The output connector must be terminated into a 50-ohm load.

r. Vary the dc control voltages from +10 to -10 volts dc, observing that the rms voltmeter indicates more than 70 millivolts rms.

s. Disconnect all input and output connections.

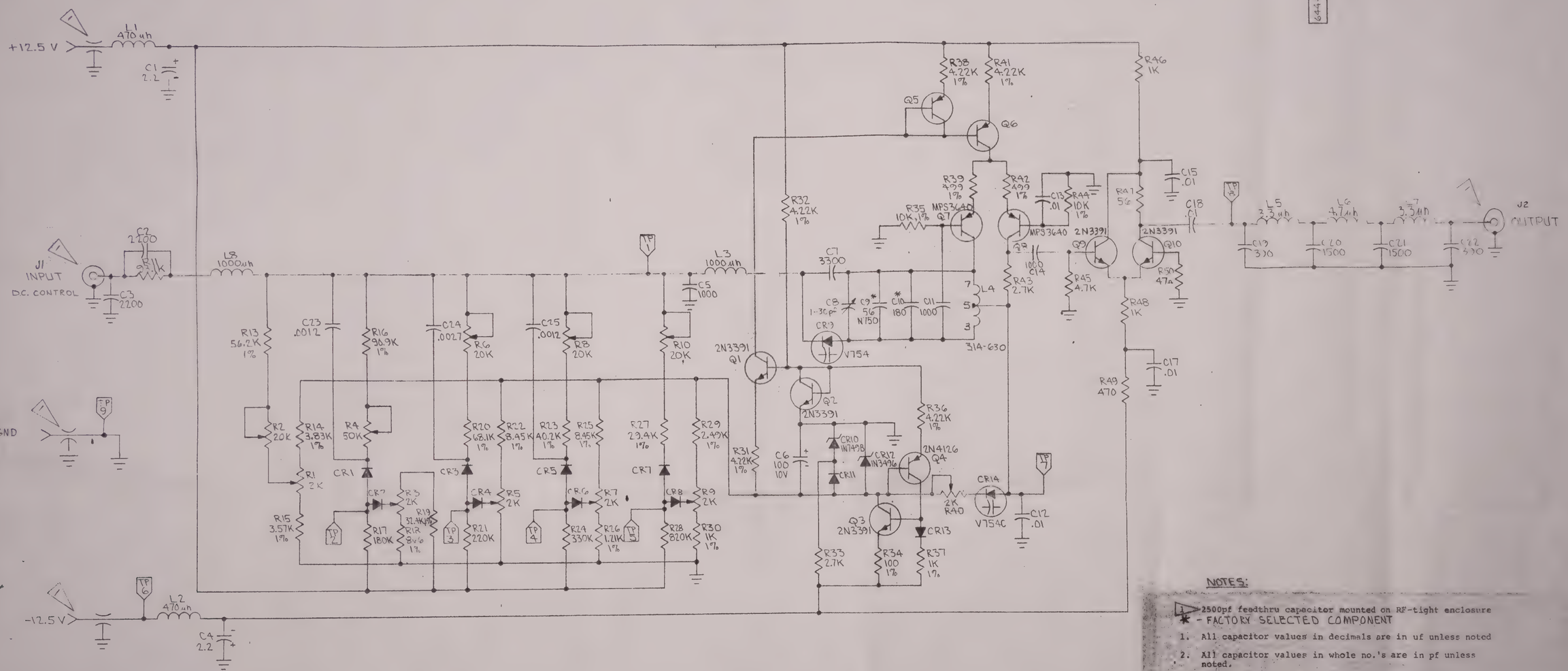


ITEM	P/N	NOMENCLATURE	REF	QTY
45	203804	RES COMP 1 MEG, 1% .5W MF	R47	
46	193945	" " " 1.5K	R40	
47	203812	" " " 4.32K	R39	
48	203770	" " " 61.9KΩ	R38	
49	203796	" " " 1.47K	R37	
50	223636	" " " 93.1KΩ	R36	
51	147906	" " " 6.81K	R35	
52	147983	" " " 100Ω	R40	
53	148023	" " " 1.5	R41,42	
54	170720	" " " 2.7KΩ	L4	
55	148072	" " " 4.7KΩ	L3 X	1 X
56	193441	" " " 180KΩ	R17	
57	160937	" " " 470Ω	R21	
58	193458	" " " 330Ω	R24	1
59	220541	" " " 750Ω	R28	1
60	104734	MOUSETAIL	---	30
~~61~~	~~212746~~	~~R.F. AMP PC MOUNT WIRE~~	~~---~~	~~---~~
64	152207	TRANSIPAD, TO-5	---	1
65	147832	RES COMP 1 MEG 5% .25W MF	RE	1

644-4024
SH | OF | REV 5

ITEM	P/N	NOMENCLATURE	REF	QTY
1	[illegible]	[illegible]	---	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	TRANSISTOR	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

644-1024 REV



NOTES:

2500pf feedthru capacitor mounted on RF-tight enclosure

* - FACTORY SELECTED COMPONENT

1. All capacitor values in decimals are in uf unless noted
2. All capacitor values in whole no.'s are in pf unless noted.
3. All resistors are 1/4W,5%,unless noted, ALL 1% RESISTORS ARE 1/8W
4. All resistor values are in ohms.
5. All inductor values are in uh.
6. All diodes are 203323 unless noted.
7. All transistors are 2N4126 unless noted.

Last No. Used:

C25 T— CR14

R50 D— Q10

REV	DESCRIPTION	DWN	CKD	APPD
3	ECO 3552 R1 WAS 1K R2 WAS 10K, & R13 WAS 61.9K			
2	DELETED C16, Q11, Q12 WERE 159855 & R50 WAS 4.7K	LL	6-4-68	
1	SPECIAL RELEASE			
1	REVISED			

REV CONTINUED AT LEFT

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED DIMS ARE IN INCHES

TOLERANCES ON

3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ± ——
ANGLES ± ——

HOLE DIA:
.014 TO .128 + .005
.136 TO .228 + .010
.234 TO .500 + .015
.500 & ABOVE + .020

DFTM	GAIL COMS	6-4-68
CHKD	R GODDALL	9-3-68
PKG ENG		
PROJ ENG		9-3-68
MFG ENG		3-26-69
ENG DEPT		9-3-68
MATERIAL:		
FINISH:		

FLUKE JOHN FLUKE MFG. CO., INC.
P.O. BOX 7428, SEATTLE, WN. 98133

SEARCH VCO

(SCHEMATIC)

PART NO	SIZE	DRAWING NUMBER
—	D	644-1024

SCALE —— WEIGHT —— SHEET 1 OF 1 REV 3

26

SEARCH MIXER

MODULE ALIGNMENT

a. Remove the screws from the metal enclosure cover, thus exposing the land pattern side of the printed circuit board.

b. Apply ±12.5 volts dc and ground to the feed-thru terminals on the metal enclosure.

c. Apply a 115 millivolt ±1 db signal from the sweep generator to J3 of the Search Mixer. Set the generator to sweep from 2.5 to 3.5 MHz. Connect the horizontal output of the sweep generator to the horizontal input of the oscilloscope and set the oscilloscope to external timebase operation. Load the output of the Search Mixer with 160 ohms in parallel with 33 picofarads.

d. Connect the ground lead of the oscilloscope to TP4 or TP5 and the signal lead to TP1. Adjust T1 for maximum voltage at 3.0 MHz.

e. Apply the 22 MHz signal having a level of 115 millivolts rms, ±1 db, to input connector, J4. Connect the signal lead of the oscilloscope to TP2. Adjust L1 and T2 for a flat response between 24.9 and 25.1 MHz.

NOTE!

To determine the 24.9 MHz and 25.1 MHz points on the oscilloscope trace, set the sweep generator to manual sweep. Adjust the manual sweep such that the frequency counter indicates 24.9 MHz. Mark this position on the oscilloscope graticule. Adjust the manual sweep for 25.1 MHz as indicated on the frequency counter. Mark the 25.1 MHz point on the graticule. Now return the sweep generator to automatic sweep and perform the required adjustments.

f. Connect the signal lead of the oscilloscope to TP3. Adjust L2 and T3 for a flat response between 24.9 MHz and 25.1 MHz.

g. Connect the signal lead of the oscilloscope to J1 or J2 and adjust L3 and T4 for a flat response between 24.9 MHz and 25.1 MHz of less than 0.5 db peak-to-peak. The inband average amplitude should be greater than 100 millivolts rms.

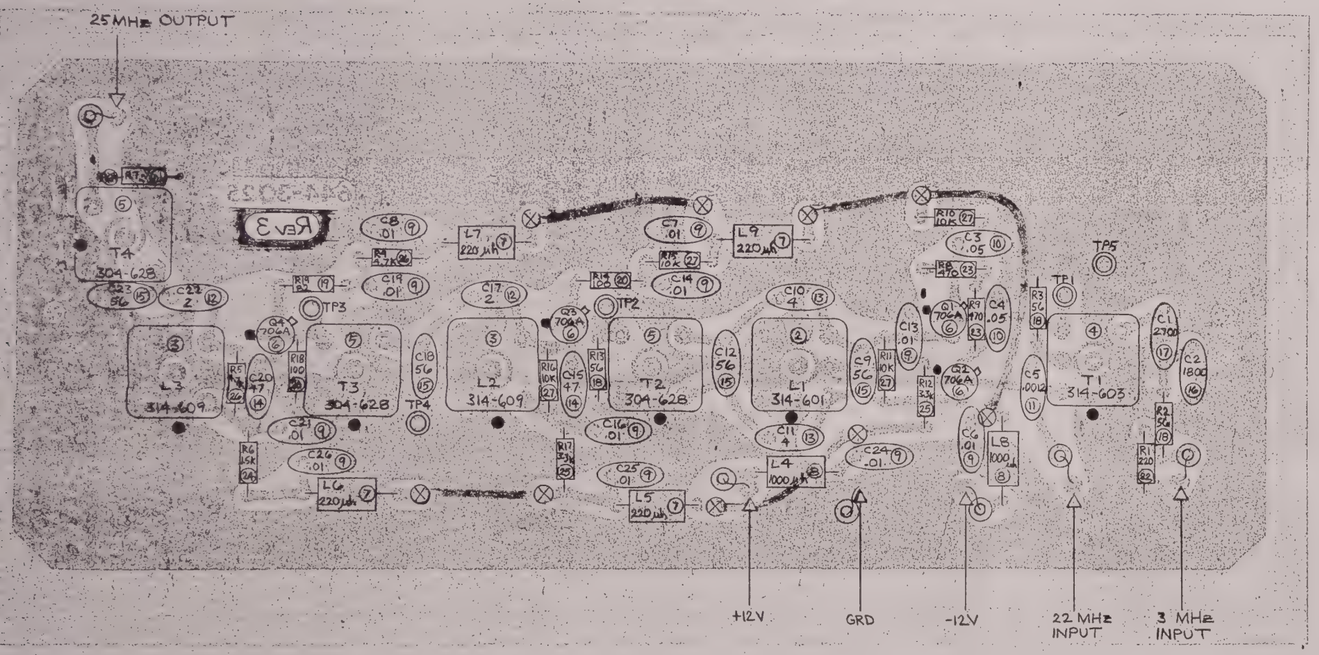
h. Remove all input and output connections.

644-4025 SH | OF | REV 2

ITEM	P/N	NOMENCLATURE	REF	QTY
1	251165	PCB FAB 644-3025	---	1
2	204826	COIL 314-601	L1	1
3	204891	" 314-609	L2,3	2
4	204842	TRANSFORMER 314-603	T1	1
5	173120	" 304-628	T2,3,4	3
6	148593	TRANSISTOR 2N706A	Q1 → Q4	4
7	147835	INDUCTOR 220uh	L5,6,7,9	4
8	147819	" 1000uh	L4,8	2
9	149153	CAPACITOR - CERAMIC .01uf	▷1	11
10	149161	" " .05uf	C3,4	2
11	106732	" " .0012uf	C5	1
12	175208	" - D.M. 2Pf	C17,22	2
13	190397	" " 4Pf	C10,11	2
14	148536	" " 47Pf	C15,20	2
15	148528	" " 56Pf	C9,12,18,23	4
16	148353	" " 1800Pf	C2	1
17	148338	" " 2700Pf	C1	1
18	147900	RESISTOR - 1/4W 5% 56Ω	R2,3,13	3
19	149484	" " " 82Ω	R19	1
20	147926	" " " 100Ω	R14,18	2
21	170712	" " " 120Ω	R7	1
22	147959	" " " 220Ω	R1	1
23	147983	" " " 470Ω	R8,9	2
24	148031	" " " 1.5KΩ	R6	1
25	148056	" " " 3.3KΩ	R12,17	2
26	148072	" " " 4.7KΩ	R4,5	2
27	148106	" " " 10KΩ	R10,11,15,16	4
28				9

NOTES:

1. ▷ C6,7,8,13,14,16,19,21,24,25,26
2. "⊗" SOLDER FEEDTHRU WIRES (BOTH SIDES) BEFORE INSTALLING COMPONENTS.
3. (●) INDICATES CLOCKING



ZONE	REV	DESCRIPTION	DWN	CKD	APPD
—	2	SPECIALS RELEASE	PR 2-27-9		
—	2	ADDED REV 3 TO ARTWORK	PR 2-21-9		3-3-69
—	1	REVISED			

FLUKE JOHN FLUKE MFG CO., INC. P.O. BOX 7428, SEATTLE, WN.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES

3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

DO NOT SCALE DRAWING

DFTM GAIL OCHS 8-2-68
PROJ ENG [illegible] 2-3-7
MFG ENG [illegible] 3-3-69

MATERIAL: —

FINISH: —

SEARCH MIXER (COMPONENT ASSEMBLY)

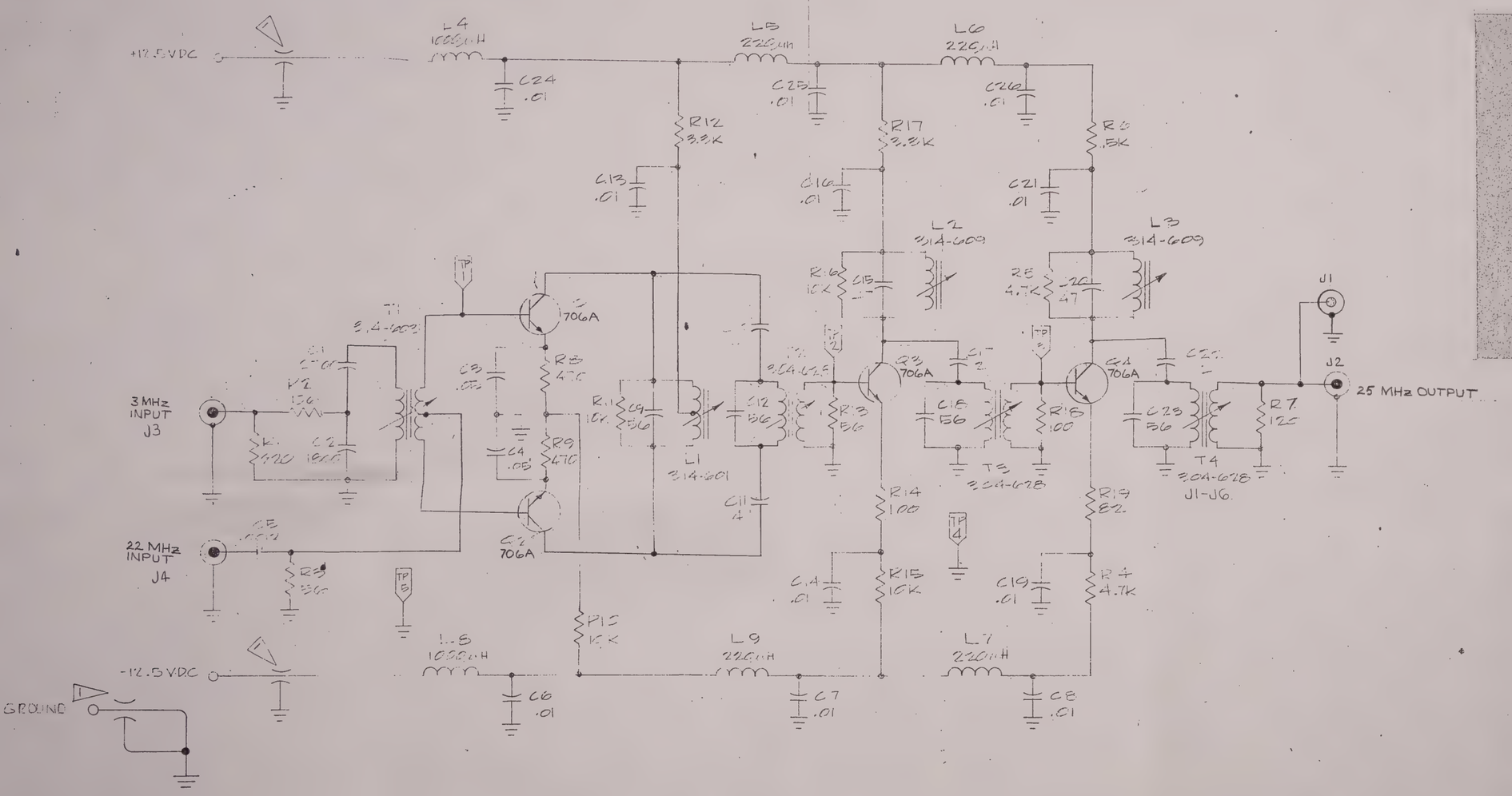
PART NO	SIZE	DRAWING NUMBER
253666	D	644-4025

SCALE 2X | SHEET 1 OF 1 | REV 2

DIST

644-1025 REV

MIXER | AMPLIFIER | AMPLIFIER



1. 2500pf feedthru capacitor mounted on RF-tight enclosure

1. All capacitor values in decimals are in uf unless noted
2. All capacitor values in whole no.'s are in pf unless noted.
3. All resistors are 1/4W, 5%, unless noted.
4. All resistor values are in ohms.
5. All inductor values are in uh.
6. All diodes are ____ unless noted.
7. All transistors are 2N706A ~~unless noted~~.

Last No. Used:

C26 T4 CR—
R19 L5 Q4

REV	DESCRIPTION	DWN	CKD	APPD
1	SPECIALS RELEASE	PR 3/26/69		
1	REVISED	PR 9-3-69		

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED DIMS ARE IN INCHES

TOLERANCES ON
3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ± —
ANGLES ± —

HOLE DIA:
.014 TO .128 + .005
.136 TO .228 + .010
.234 TO .500 + .015
.500 & ABOVE + .020

DFTM GAIL OCHS 5-22-68
CHKD
PKG ENG
PROJ ENG 9-3-69
MFG ENG 7-26-69
ENG DEPT 9-3-69
MATERIAL: —
FINISH: —

FLUKE
JOHN FLUKE MFG. CO., INC.
P.O. BOX 7428, SEATTLE, WN. 98133

SEARCH MIXER
(SCHEMATIC)

PART NO	SIZE	DRAWING NUMBER
—	D	644-1025

SCALE — | WEIGHT — | SHEET | OF | REV 1

OK D.L. 9/3

MARKER GENERATOR

MODULE ALIGNMENT

a. Remove the screws from the metal enclosure cover thus exposing the land pattern side of the printed circuit board. Install in its place a test cover to secure the circuit board during alignment.

b. Apply ±12 volts dc and ground to the feed-thru terminals on the metal enclosure.

c. Connect a variable voltage supply to J4. Adjust the supply to 0 volts.

d. Connect a counter to TP2, using TP3 as a ground.

e. Adjust R24 to set the marker multivibrator frequency to 150 kHz.

f. Set the variable voltage supply to +10 volts. Adjust R8 to set the marker multivibrator frequency to 250 kHz.

g. Set the variable voltage supply to -10 volts. Readjust R8 to correct multivibrator frequency to 250 kHz.

h. Repeat steps f and g to achieve best compromise setting for positive and negative inputs. Maximum error on either polarity should not exceed 2 kHz.

i. Apply a 3.0 MHz signal at a level of 100 millivolts rms, ±1 db, to input connector, J5.

j. Apply a 3.0 MHz signal from the sweep generator at a level of 100 millivolts rms, ±1 db, to input connector, J1.

k. Monitor TP1 with the rms voltmeter using a high impedance probe. Adjust T1 for maximum level at TP1.

l. Connect the oscilloscope to J3. Sweep the oscilloscope with the sweep generator sawtooth voltage. With the sweeper going from 2.9 to 3.1 MHz, the oscilloscope should have a display with a zero-beat at mid-screen and a sine wave of increasing frequency that rises to 100 kHz at the screen edges. Its amplitude at the band edges is approximately .5 volts peak-to-peak.

m. Disconnect the sweep generator from the module.

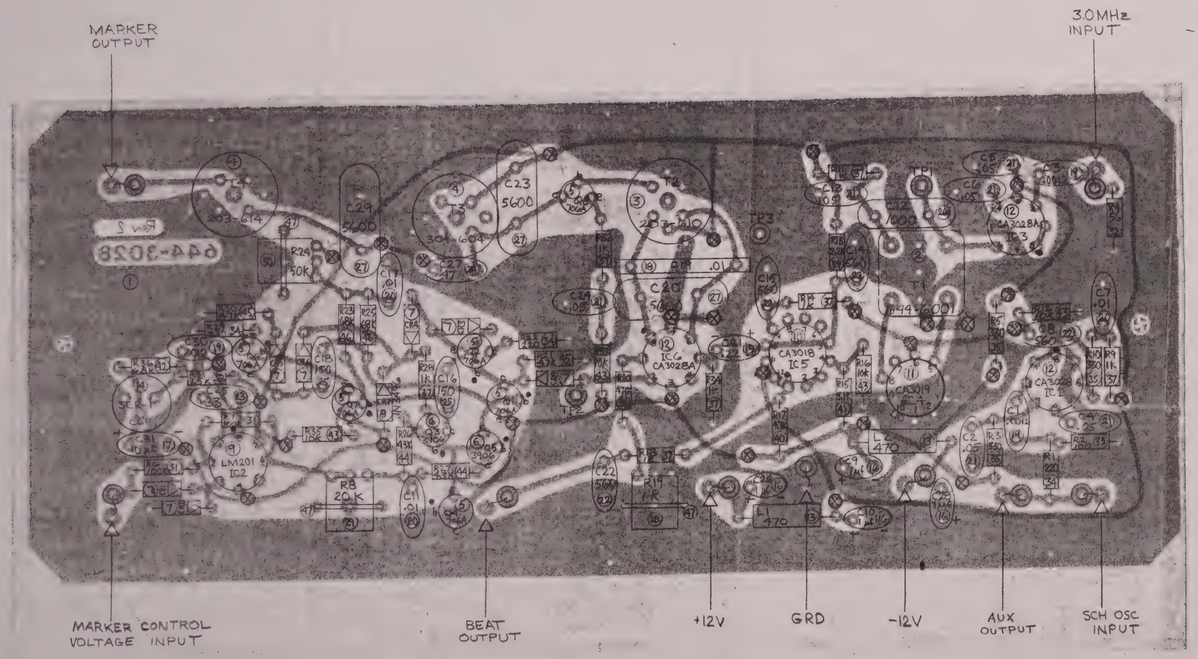
n. Connect the oscilloscope to J6. Use the oscilloscope internal time-base at 10 microseconds per centimeter.

o. Adjust the variable voltage supply to set the marker multivibrator frequency to 150 kHz.

p. Set R19 fully clockwise. Tune T2, T3 and T4 for maximum 150 kHz output.

q. Adjust R19 to obtain a null in 150 kHz output.

r. Reconnect the sweep generator to the Marker module and to the oscilloscope horizontal input. Use a 100 millisecond sweep period. Vary the marker control voltage from -10 to +10 volts while checking the oscilloscope display for proper marker generation. The markers should be two volts peak-to-peak



NOTES:

1. ⊗ - SOLDER FEEDTHRU WIRES BOTH SIDES BEFORE INSTALLING COMPONENTS
2. (●) DOT INDICATES CLOCKING.
3. ALL DIODES ARE IN270 EXCEPT AS NOTED.

644-4028 SH 1 OF 1 REV

ITEM	P/N	NOMENCLATURE		
1				
2				
3	181156	"	203-610	T2
4	181164	"	203-614	T3,4
5	144597	TRANSISTOR	2N3063	Q1,2,3,4,5,6
6	195974			
7	148163			
8	172346			
9				
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30	148059			
40	148172			
41	113167			
42				
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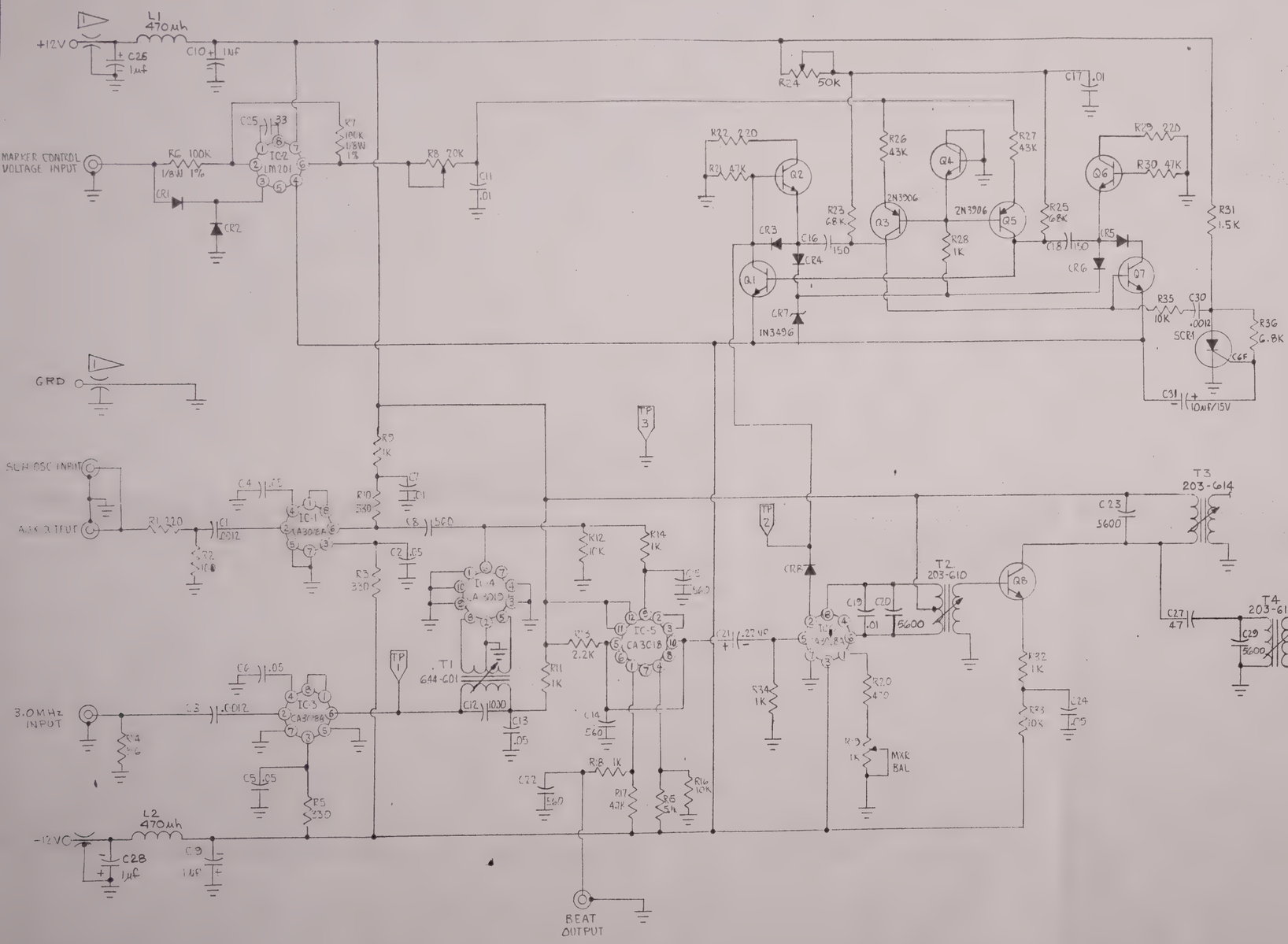
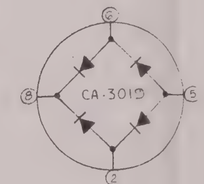
45				
46				
47				

ZONE	REV	DESCRIPTION	DWN	CKD	APVD
	2				
	1				

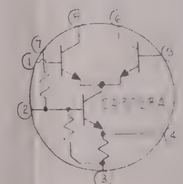
FLUKE JOHN FLUKE MFG CO., INC. P.O. BOX 7428, SEATTLE, WN.	DO NOT SCALE DRAWING	MARKER GENERATOR (COMPONENT ASSEMBLY)	
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES	DFTM GAIL OCHS 8-28-68	PART NO	SIZE / DRAWING NUMBER
3 PLACE DECIMALS ± .010	PROJ ENG	253690	D 644-4028
2 PLACE DECIMALS ± .02	MFG ENG	SCALE 2x	SHEET 1 OF 1 REV
FRACTIONS ±	MATERIAL		
ANGLES ± X CONST.	FINISH		

644-1028 SH - OF - REV !





IC-4



IC-5

IC-5

1 2500pf feedthru capacitor mounted on RF-tight enclosure

1. All capacitor values in decimals are in uf unless noted
2. All capacitor values in whole no.'s are in pf unless noted.
3. All resistors are 1/4W, 5%, unless noted.
4. All resistor values are in ohms.
5. All inductor values are in uh.
6. All diodes are IN270 unless noted.
7. All transistors are 2N706A unless noted.

Last No. Used:

C 31 T 4 CR 8
R 35 L 2 Q 8

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
—	1	REVISED			

FLUKE JOHN FLUKE MFG CO., INC. P.O. BOX 7428, SEATTLE, WN.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES
3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

DO NOT SCALE DRAWING

DFTMN	THOMPSON	7-7-65
PROJ ENG		
MFG ENG		3-24-66
MATERIAL:	—	
FINISH:	—	

MARKER GENERATOR (SCHEMATIC)

PART NO	SIZE	DRAWING NUMBER
—	D	644-1028
SCALE —	SHEET — OF —	REV 1

DIST 2C

DIGIT ADDER NO. 1

MODULE ALIGNMENT

a. Remove the screws from the metal enclosure cover, thus exposing the land pattern side of the printed circuit board.

b. Apply a 3.05 MHz signal at a 100 millivolt ±1 db level to the low frequency input, J2.

c. Apply ±12.5 volts dc and ground to the feed-thru terminals on the metal enclosure.

d. Connect the oscilloscope to TP1. Adjust T1 for maximum signal amplitude at this point.

e. Remove the low frequency input from J2.

f. Apply a swept frequency from 24.5 MHz to 25.5 MHz at a level of 40 millivolts rms, ±1 db to J1. Connect the horizontal input of the oscilloscope to the horizontal drive output of the sweep generator so that the oscilloscope will present a swept-frequency display.

g. Adjust T3 for maximum 25 MHz signal as displayed on the oscilloscope at TP1.

h. Connect the vertical input of the oscilloscope to TP2.

i. Reapply the low frequency input to J2. Switch the sweep generator to manual tuning and monitor the Digit Adder output frequency with a counter. Manually tune the generator to Digit Adder output frequencies of 27.85 and 28.25 MHz, and establish reference marks on the oscilloscope graticule at these points.

j. Adjust L1 and T2 for a maximum response between markers.

k. Connect the vertical input of the oscilloscope to TP3.

l. Adjust L2 and T4 for maximum signal amplitude and flatness between 27.9 MHz and 28.2 MHz.

m. Connect the rf voltmeter, 50-ohm load, and oscilloscope input to the module output connector J3.

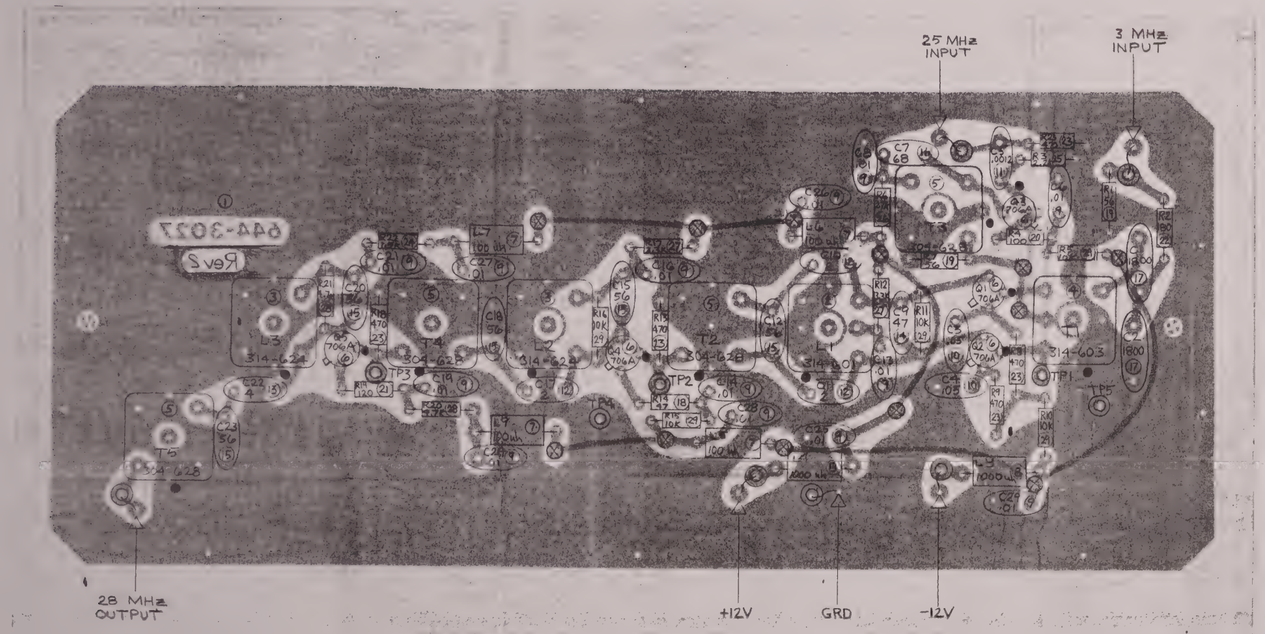
n. Adjust L3 and T5 for a flat response.

o. Set the sweep generator sweep control to manual sweep.

p. Manually sweep the sweep generator output signal from 24.5 MHz to 25.5 MHz. Stop the sweep at 27.9 MHz (as indicated on counter) and note its position on the oscilloscope. Continue sweeping to 28.2 MHz. Note that the rms voltmeter does not vary more than 0.5 db between 27.9 MHz and 28.2 MHz.

q. If the conditions in step p cannot be met, readjust T1, T2, T4, L1, L2 and T3 for a flat response as displayed on the oscilloscope at the output connector, J3. Then repeat step p until the limits can be met.

r. Remove all test equipment from the Digit Adder Module No. 1.



NOTES:

1. C6, 8, 13, 14, 16, 19, 21, 24, 25, 26, 27, 28, 29
2. ● - DOT INDICATES CLOCKING
3. ⊗-SOLDER FEED THRU WIRES (BOTH SIDES) BEFORE INSTALLING COMPONENTS. (12 PL)

644-4027 SH 1 OF 1 REV 2

ITEM	P/N	NOMENCLATURE	REF	QTY
1	251173	P.C.B. 644-3027	—	1
2	204826	COIL 314-601	L1	1
3	204990	" 314-624	L2,3	2
4	204842	TRANSFORMER 314-603	T1	1
5	177120	" 314-628	T2→T5	4
6	148593	TRANSISTOR 2N706A	Q1→Q5	5
7	174755	INDUCTOR 100 uh	L5,6,7,9	4
8	147819	" 1000 uh	L4,8	2
9	149153	CAPACITOR-CERAMIC .01	1	13
10	147161	" .05	C3,4	2
11	106732	" " .0012	C5	1
12	177208	" -D.M 2 pf	C10,11,17	3
13	190397	" " 4 pf	C1,2	1
14	148536	" " 47 pf	C4	1
15	149528	" " 56 pf	C12,15,18,22,23	5
16	148510	" " 68 pf	C7	1
17	148356	" " 1800 pf	C1,2	2
18	147892	RESISTOR ½W 5% 47Ω	R14	1
19	147900	" " 56Ω	R1,7	2
20	147926	" " 100Ω	R9	1
21	177712	" " 120Ω	R19	1
22	147942	" " 180Ω	R2	1
23	147983	" " 470Ω	RR 4,13,16,23	5
24	148031	" " 1.5 kΩ	R22	1
25	148049	" " 2.2 kΩ	R3	1
26	170720	" " 2.7 kΩ	R6	1
27	148056	" " 3.3 kΩ	R12	1
28	148072	" " 4.7 kΩ	R5	1
29	148106	" " 8 kΩ	RR 10,11,15,17,18	5

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
—	2	SPECIALS RELEASE			
—	2	STEP REV'D IN ART WORK			
—	1	REVISED			

FLUKE JOHN FLUKE MFG CO., INC. P.O. BOX 7428, SEATTLE, WN.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES
3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

DO NOT SCALE DRAWING
DFTM GAIL OCHS 8-24-68
PROJ ENG
MFG ENG 3-3-6
MATERIAL —
FINISH: —

DIGIT ADDER #1 (COMPONENT ASSEMBLY)

PART NO	SIZE	DRAWING NUMBER
253682	D	644-4027

SCALE 2X SHEET 1 OF 1 REV 2

DIST

644-1027 | REV 1

AMP | MIXER | AMPLIFIER | AMPLIFIER

L4 1000 uH

+12.5 VDC

L6 100 uH

L7 100 uH

C25 .01

C26 .01

C27 .01

R6 2.7K

C8 .01

R12 3.3K

C13 .01

R17 3.3K

C16 .01

R22 1.5K

C21 .01

L2 314-624

L3 314-624

TP 4

Q1

T1 314-603

R16 10K

C15 56

R21 4.7K

C18 56

C10 2

T2 304-628

TP 2

C17 2

T4 304-628

TP 3

C22 4

T5 304-628

OUTPUT J3

J2 3 - 3.1 MHz INPUT

C1 1800

R2 180

C3 .05

R8 470

R11 10K

C12 56

R13 470

Q4

C18 56

R18 470

Q6

C23 56

R1 56

C2 1800

C4 .05

R9 470

L1 314-601

C11 2

R14 47

R19 120

TP 1

Q2

TP 5

C14 .01

R15 10K

C19 .01

R20 4.7K

T3 304-628

R10 10K

L5 100 uH

L9 100 uH

C7 68

R7 56

C29 .01

C28 .01

C24 .01

J1 25 MHz INPUT

C5 .0012

Q3

R23 470

R22 2.2K

R4 100

C6 .01

R5 10K

L8 1000 uH

+12.5 VDC

GROUND

1 2500pf feedthru capacitor mounted on RF-tight enclosure

1. All capacitor values in decimals are in uf unless noted
2. All capacitor values in whole no.'s are in pf unless noted.
3. All resistors are 1/4W, 5%, unless noted.
4. All resistor values are in ohms.
5. All inductor values are in uh.
6. All diodes are ____ unless noted.
7. All transistors are 2N706A unless noted.

Last No. Used:

C 29 T 5 CR —

R 23 L 9 Q 5

REV	DESCRIPTION	DWN	CKD	APPD
1	SPECIALS RELEASE	DR 8-26-68		
1	REVISED			

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED DIMS ARE IN INCHES

TOLERANCES ON

3 PLACE DECIMALS ±.010
2 PLACE DECIMALS ±.02
FRACTIONS ± —
ANGLES ± —

HOLE DIA:
.014 TO .128 +.005
.136 TO .228 +.010
.234 TO .500 +.015
.500 & ABOVE +.020

DFTM GAIL OCHS 8-22-68
CHKD D [illegible] ALL
PKG ENG
PROJ ENG
MFG ENG
ENG DEPT
MATERIAL:
FINISH:

FLUKE

JOHN FLUKE MFG. CO., INC.
P.O. BOX 7428, SEATTLE, WN. 98133

DIGIT ADDER #1

(SCHEMATIC)

PART NO	SIZE	DRAWING NUMBER
—	D	644-1027

SCALE — | WEIGHT — | SHEET 1 OF 1 | REV

MODULE ALIGNMENT

a. Remove the screws from the metal enclosure cover, thus exposing the land pattern side of the printed circuit board. Install in its place a test cover to secure the circuit board during alignment.

b. Operate the sweep generator in the cw mode. Using the frequency counter, set its frequency to 2.45 MHz and set the high frequency generator to 28.05 MHz.

c. Connect the sweep generator rf output to J2 of the Digit Adder, and adjust its level to 70 millivolts ±1 db. Connect the high frequency signal generator to J1 of the Digit Adder, setting its level to 115 millivolts ±1 db. Connect a 50-ohm load to the module output, J3.

d. Connect the rf voltmeter to TP2. Adjust T1, T2, T3, L1, and L2 for maximum signal voltage. Connect a counter to TP2 using a high-impedance probe and verify that the resonant circuits are tuning to the mixer sum frequency output at 30.5 MHz.

e. Move the rf voltmeter to TP1. Adjust L3, L4, L5 and T4 for maximum output.

f. Connect the rf voltmeter in parallel with a 50-ohm load to the module output, J3. Adjust T5 and T6 for maximum output.

g. Disconnect the voltmeter and connect a monitor tee and 50 ohm load to the Digit Adder output. The dc output of the monitor tee connects to the oscilloscope for swept frequency viewing of the bandpass.

h. Monitor the Digit Adder output frequency with a counter. Turning the sweep generator manually, establish reference marks on the oscilloscope graticle at output frequencies of 30 and 31 MHz.

i. Place the sweep generator in the sweeping mode of operation. Sweep at a line frequency rate from 1.5 to 3.5 MHz.

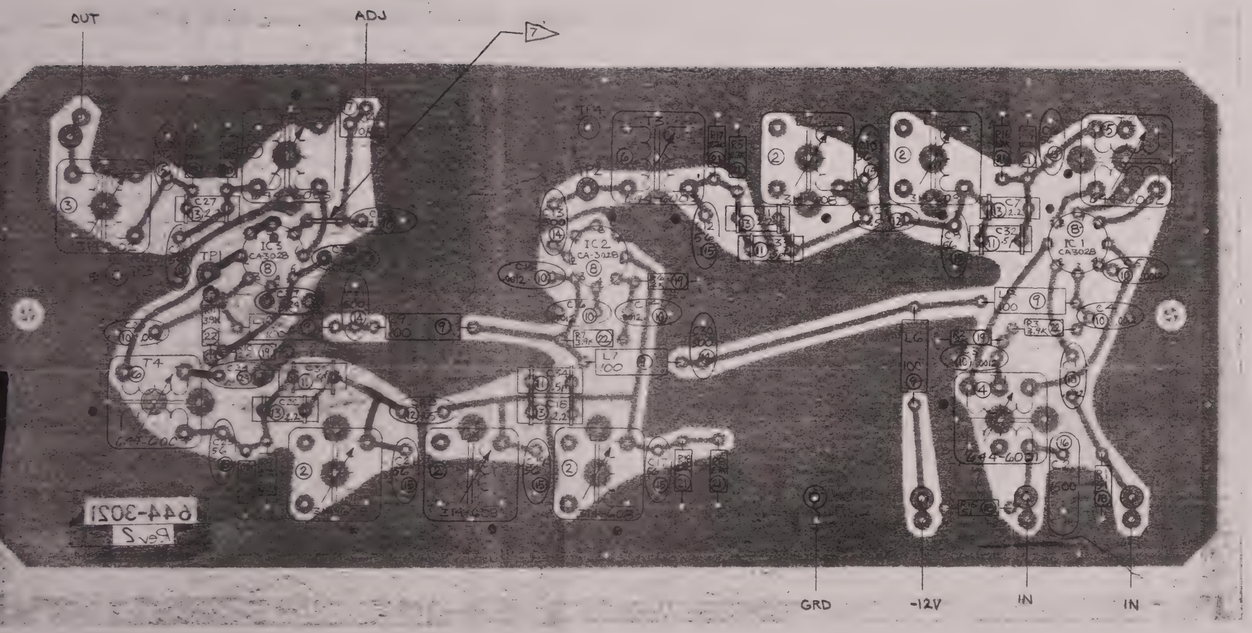
j. Fine tune T2, T3, T4, T5, T6, L1, L3, L4, and L5 for maximum flatness of the digit adder 30 to 31 MHz passband.

k. Connect the output of the Digit Adder to an NF-105 receiver. In place of the sweep generator, connect a fixed frequency signal generator tuned to 2.5 MHz. Its output level should be 100 millivolts.

l. Measure the relative signal level of the 28.05 MHz carrier and of a possible spurious output at 33.05 MHz. These should be at least 90 db below the desired 30.55 MHz output signal. If they are not, the resonant circuits listed in step j can be fine-tuned to reject them without significantly changing the passband shape.

m. Connect a 50-ohm load and the rms voltmeter to the module output, J3. Adjust R14 to set output level at 60 millivolts rms.

n. Remove all test equipment from the Digit Adder No. 2.



NOTES:

1. ▷ C1, 3, 4, 5, 14, 15, 16, , 25, 29
2. ▷ C6, 8, 10, 12, 17, 19, 21, 23, 26, 28
3. ▷ R4, 5, 8, 9, 16, 17, 18, 19
4. CANS ON L1, L3, L5, T2, T3, T4, T5, T6 SHOULD BE SOLDERED DOWN TO GROUND PLANE ON COMPONENT SIDE
5. DOT (●) INDICATES CLOCKING.
6. DRESS CYLINDRICAL CAPACITORS AWAY FROM MICRO METAL CANS AND EACH OTHER.
7. ▷ INSTALL #22 JUMPER WIRE.

644 4021 SH 1 OF 1 REV 4

ITEM	P/N	NOMENCLATURE	REF	QTY
			▷	9
				4
				3
				6
	1N5711			11
	1N6320		▷	12
16	1N [illegible]			1
17	1N746A		R33	1
	2 [illegible]		R1,11	2
	3 [illegible]		R2,6,10	3
	4 [illegible]		R12	1
	[illegible]720		▷	8
12	33 [illegible]		R3,7,11	3
	4 [illegible]			1
14	49 [illegible]			3

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
—	4	SPECIAL RELEASE			
—	4	ADDED REV 2 TO ART WORK			
—	3 2	REVISED [illegible]			
—	1	REVISED			

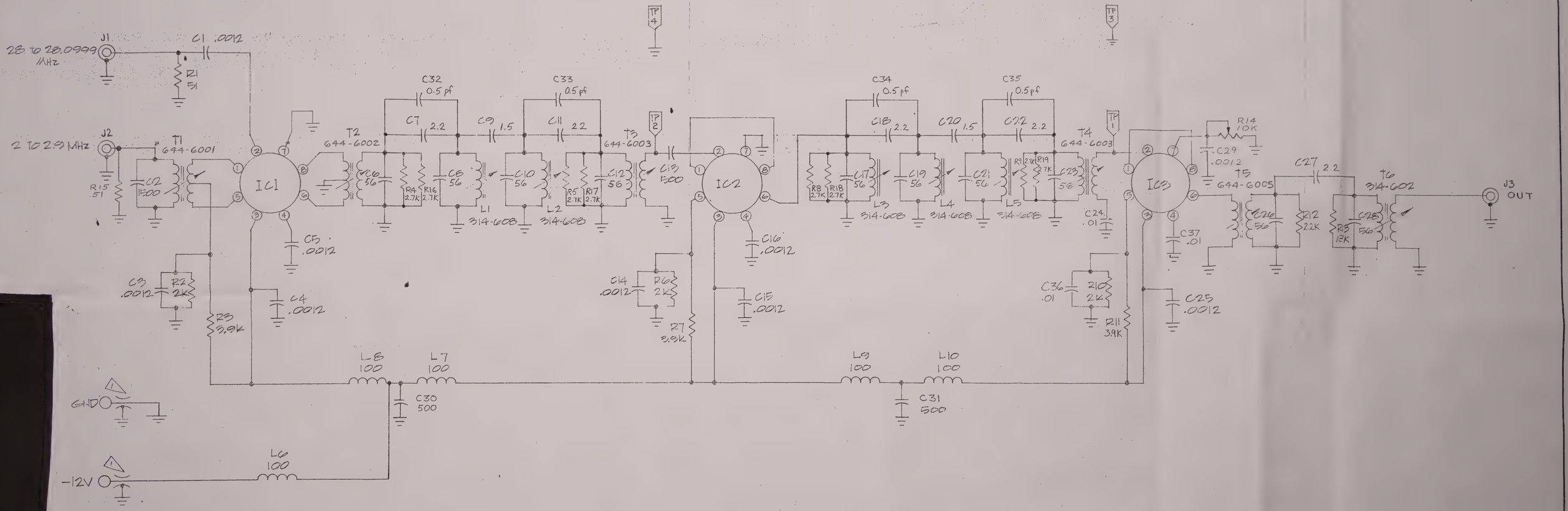
FLUKE JOHN FLUKE MFG CO., INC. P.O BOX 7428, SEATTLE, WN.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES
3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

DO NOT SCALE DRAWING
DFTM GAIL OCHS 7-16-8
PROJ ENG
MFG ENG
MATERIAL: —
FINISH: —

DIGIT ADDER #2 (COMPONENT ASSEMBLY)

PART NO 253625 | SIZE D | DRAWING NUMBER 644-4021
SCALE 2X | SHEET 1 OF 1 | REV 4



1 2500pf feedthru capacitor mounted on RF-tight enclosure

1. All capacitor values in decimals are in uf unless noted
2. All capacitor values in whole no.'s are in pf unless noted.
3. All resistors are 1/4W,5%,unless noted.
4. All resistor values are in ohms.
5. All inductor values are in uh.
6. All IC'S are CA3028A , unless noted.
7. All transistors are _____ unless noted.

Last No. Used:

C37 T6 CR__

R19 L10 Q__

REV	DESCRIPTION	DWN	CKD	APPD
2	SPECIALS RELEASE	DR 3-26-69	BD	
2	REVISED	4-14-69	4-23-69	TRL
1	REVISED	11-19-68	11-25-68	TRL

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED DIMS ARE IN INCHES

TOLERANCES ON

3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±____
ANGLES ±____

HOLE DIA:
.014 TO .128 + .005
.136 TO .228 + .010
.234 TO .500 + .015
.500 & ABOVE + .020

DFTM Kay Tennyson 2/68
CHKD
PKG ENG
PROJ ENG B. Hall 8-25-8
MFG ENG L. Hall 7-26-69
ENG DEPT R. Hall 8-25-8
MATERIAL: —
FINISH: —

FLUKE

JOHN FLUKE MFG. CO., INC.
P.O. BOX 7428, SEATTLE, WN. 98133

DIGIT ADDER #2
(SCHEMATIC)

PART NO	SIZE	DRAWING NUMBER
—	D	644-1021

SCALE — WEIGHT SHEET 1 OF 1 REV 2

644-1021 REV 2

VHF GATE

TEST PROCEDURE

The VHF Gate requires no adjustment, however, certain tests can be made to assure proper operation of the gates. These tests are given as insertion loss and gate-off isolation checks. The insertion loss check is a measure of the difference between the input signal power and the output signal power, with the gate on. It can be expressed mathematically by:

$$\text{I. L.} = 10 \log \frac{P_{in}}{P_{L(on)}}$$

Where P_{in} = power available at input, and $P_{L(on)}$ = power delivered to the load with the gate on.

The gate-off isolation check is a measure of the difference between the input signal power and the output signal power with the gate off. It is expressed mathematically by:

$$\text{IS} = 10 \log \frac{P_{in}}{P_{L(off)}}$$

Where P_{in} = power available at input, and $P_{L(off)}$ = power delivered to the load with the gate off.

The two tests require the following test equipment. The recommended equipment is listed in Section III.

a. ±12 volt dc regulated supply

b. Resistive load - 50 ohms

c. RMS voltmeter

d. Field intensity meter

e. Signal generator

f. Adaptors and cables as needed

Proceed as follows:

BASIC CONNECTIONS

a. Connect the rf voltmeter with a 50-ohm termination to the output connector, J2.

b. Apply a 50 MHz signal at 200 millivolts ±1 db to the input connector, J1.

Insertion Loss Check

a. Apply -12 volts and ground to the power terminals on the module. Apply +12 volts to the control terminal.

b. The rf voltmeter should read 50 millivolts minimum, corresponding to a maximum allowable insertion loss of 12 db.

Gate-Off Isolation Check

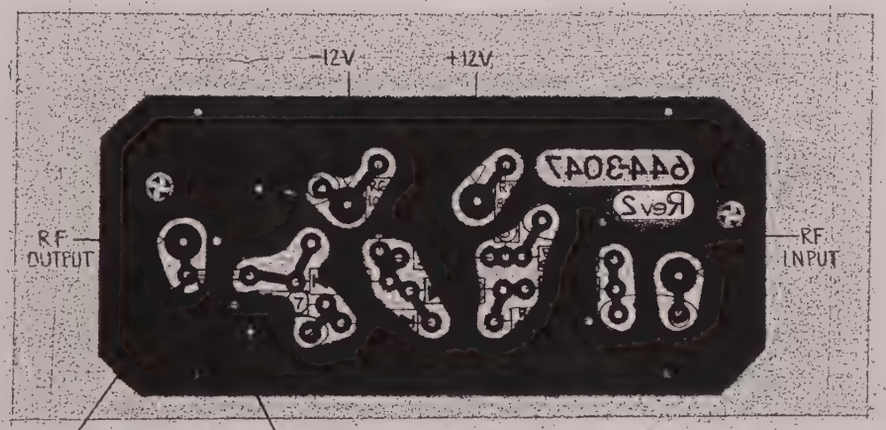
a. Remove the rf voltmeter and substitute a field strength receiver.

b. Tune the receiver to the gate output signal at 50 MHz. Set the receiver's input attenuator on the 80-100 db range, and adjust the IF gain to give a full scale deflection of the signal strength meter. This establishes a +100 db reference level.

c. Remove the +12 volt connection from the control terminal of the gate. This turns the gate OFF.

d. Set the input attenuator on the field-strength receiver to the 0 to 20 db range. The signal level should now read +5 db or less on this scale, corresponding to a 95 db minimum on-to-off ratio.

ITEM	P/N	NOMENCLATURE	REF	QTY
1	254805	PCB FAB (644-3047)	-	1
2	149153	CAPACITOR CER .01uf	C1 → C4	4
3	149187	DIODE (1N270)	CR1 → CR4	4
4	147983	RESISTOR 1/4W 5% 470	R3	1
5	148015 ~~153999~~	" " " 820	R2	1
~~2~~	~~202853~~	~~" " " 1K~~	~~R7~~	~~1~~
7	148031	" " " 1.5K	R5	1
8	202879	" " " 2K	R4	1
9	148098	" " " 6.8K	R1	1
10	148106	" " " 10K	R6	1
11	115469	#22 AWG BUS WIRE	——	.10FT
12	196717	#22 TEFLON SLEEVING	——	.10FT



644-4047
SH 1 OF 1 REV 5

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
—	5	SPECIALS RELEASE	PR 2-20-9	BS 3-5-69	7-2-69
—	5	ADDED REV. 2 TO ART WORK	PR 2-21-9	✓	3-3-69
D2 C4	4	CORRECTED P/N ITEM 5	PC 2-20-9	2-20-9	
	3	DELETED ITEM 6	L.L.	12-4-68	
—	2	DELETED (1) ITEM 2 & ADDED ITEM 11 & 12	L.L.	[illegible] 12-5-68	12-11-68
—	1	REVISED	[illegible] 11-27-68	[illegible] 12-3-68	12-4-68

FLUKE JOHN FLUKE MFG CO., INC.
P.O. BOX 7428, SEATTLE, WN.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES
3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

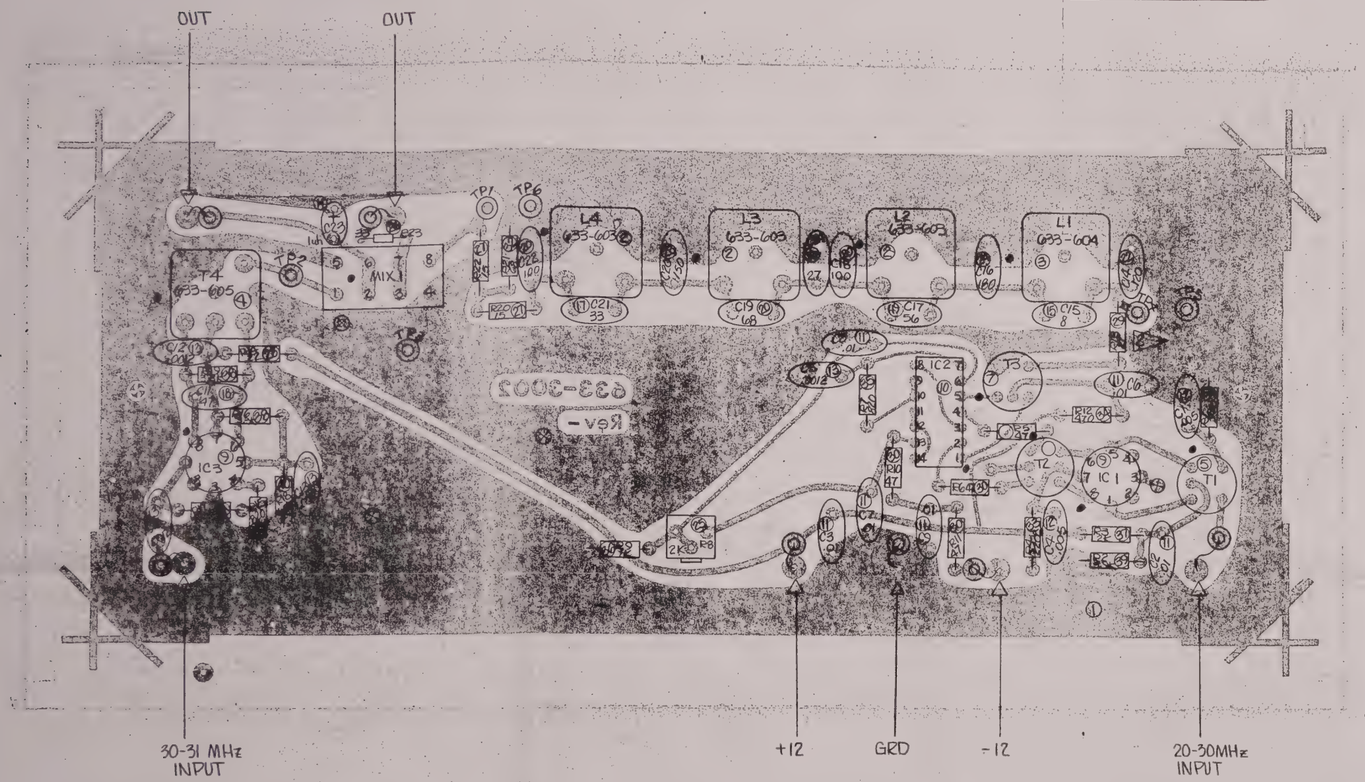
DO NOT SCALE DRAWING
DFTM K. THOMPSON 7-6-68
PROJ ENG [illegible] 7-6-68
MFG ENG [illegible] 3-26-69
MATERIAL: ——
FINISH: ——

VHF GATE
COMPONENT ASSY

PART NO	SIZE	DRAWING NUMBER
254797	C	644-4047

SCALE 2X SHEET 1 OF 1 REV 5

DIST 965



NOTES:

1. ⊗ SOLDER FEEDTHRUS BOTH SIDES BEFORE INSTALLING COMPONENTS. (3 PLS)

1 ▷ C2, C3, C6, C7, C8, C9

2 ▷ ITEM (29), R13 IS INSTALLED AFTER PRELIMINARY TEST OF CKT. BOARD.

633-4002 SH 1 OF 1 REV —

ITEM	P/N	NOMENCLATURE	REF	QTY
1	274613	PCB 633-3002	—	1
2	275115	COIL 633-6003	L2, L3, L4	3
3	275123	" 633-6004	L1	1
4	275131	" 633-6005	T4	1
5	275149	" 633-6006	T1	1
6	275156	" 633-6007	T2	1
7	275164	" 633-6008	T3	1
8	272997	RELCOM MIXER M9B	MIX1	1
9	246256	INTER. CIRCUIT CA3028A	IC1, IC3	2
10	248906	" " CA3046	IC 2	1
11	149153	CAPACITOR - CER .01	1▷	6
12	149161	" " .005	C1, C4	2
13	106732	" " .0012	C5, C10, C12, C13	4
14	161919	" TANT 1ul 35V	C23	1
15	216986	" D.M 8	C15	1
16	177998	" " 27	C24	1
17	160317	" " 33	C21	1
18	148536	" " 47	C11	1
19	148528	" " 56	C17	1
20	148510	" " 68	C19	1
21	148494	" " 100	C18, C22	2
22	148486	" " 120	C14	1
23	148478	" " 150	C20	1
24	148460	" " 180	C16	1
25	208330	RESISTOR - VAR 2K	R8	1
26	272914	" Y8W 10% 33	R23	1
27	147876	" Y4W 5% 15	R20, R22	2
28	147884	" " " 22	R14	1
29	160812	" " " 27	R13	1
30	147892	" " " 41	R6, R10, R11	3
31	147900	" " " 56	R17	1
32	147918	" " " 68	R21	1
33	147959	" " " 220	R4	1
34	147983	" " " 470	R1, R12	2
35	148015	" " " 820	R7, R15	2
36	148023	" " " 1K	R9	1
37	202879	" " " 2K	R3	1
38	148056	" " " 3.3K	R16, R19	2
39	148064	" " " 3.9K	R2	1
40	148098	" " " 6.8K	R18	1

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
	-	RELEASE FOR PROD	MX 5-20-9	BS 5-21-9	CJ 5-22-9

FLUKE JOHN FLUKE MFG CO., INC. P.O. BOX 7428, SEATTLE, WN.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES

3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± ~~X CONST.~~

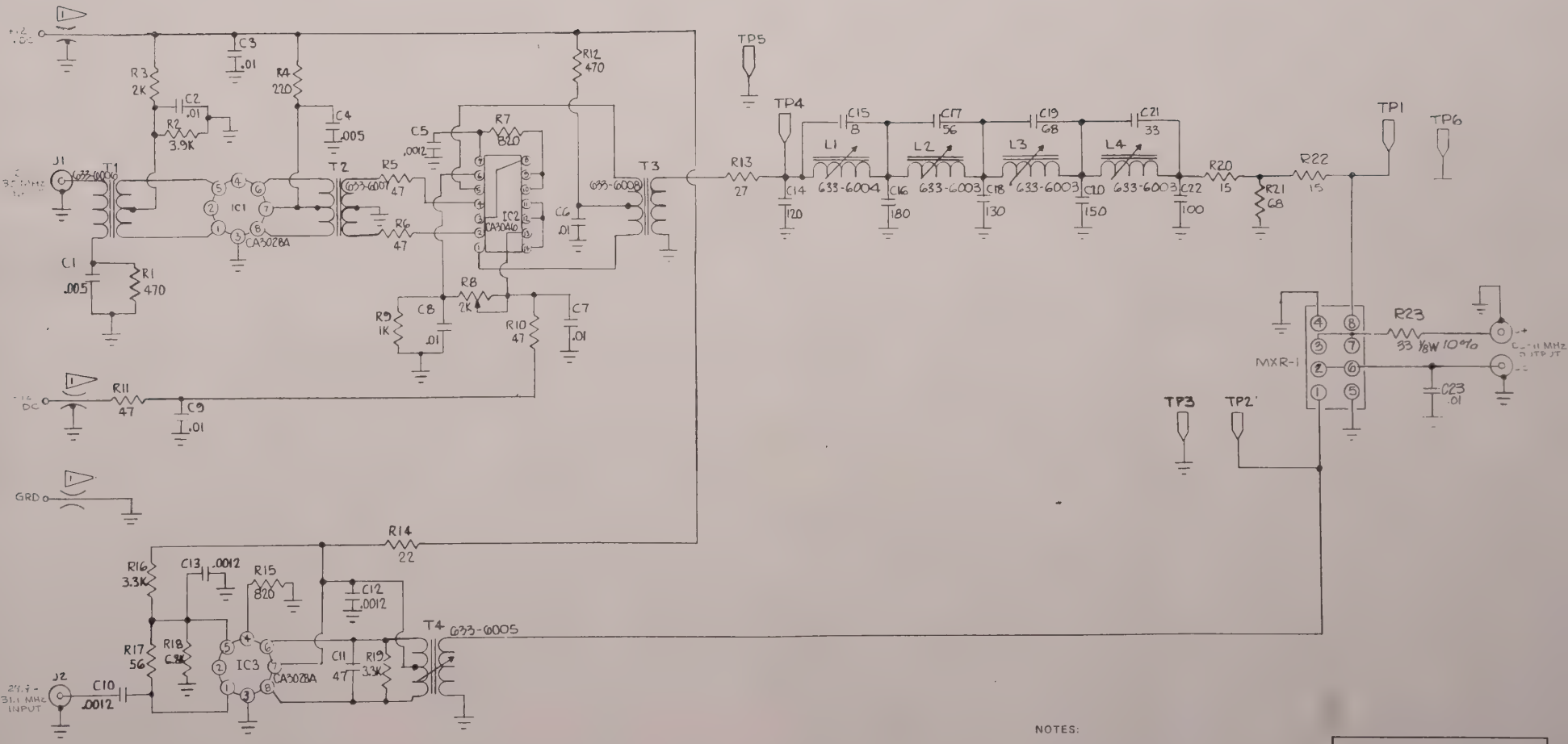
DO NOT SCALE DRAWING
DFTM REYNOLDS 5-19-9
PROJ ENG B. Smith 5-21-9
MFG ENG L. Hart 5-22-9
MATERIAL:
FINISH:

OUTPUT MIXER (COMPONENT ASSEMBLY)

PART NO	SIZE	DRAWING NUMBER
274639	D	633-4002

SCALE 2X | SHEET 1 OF 1 | REV —

DIST



NOTES:

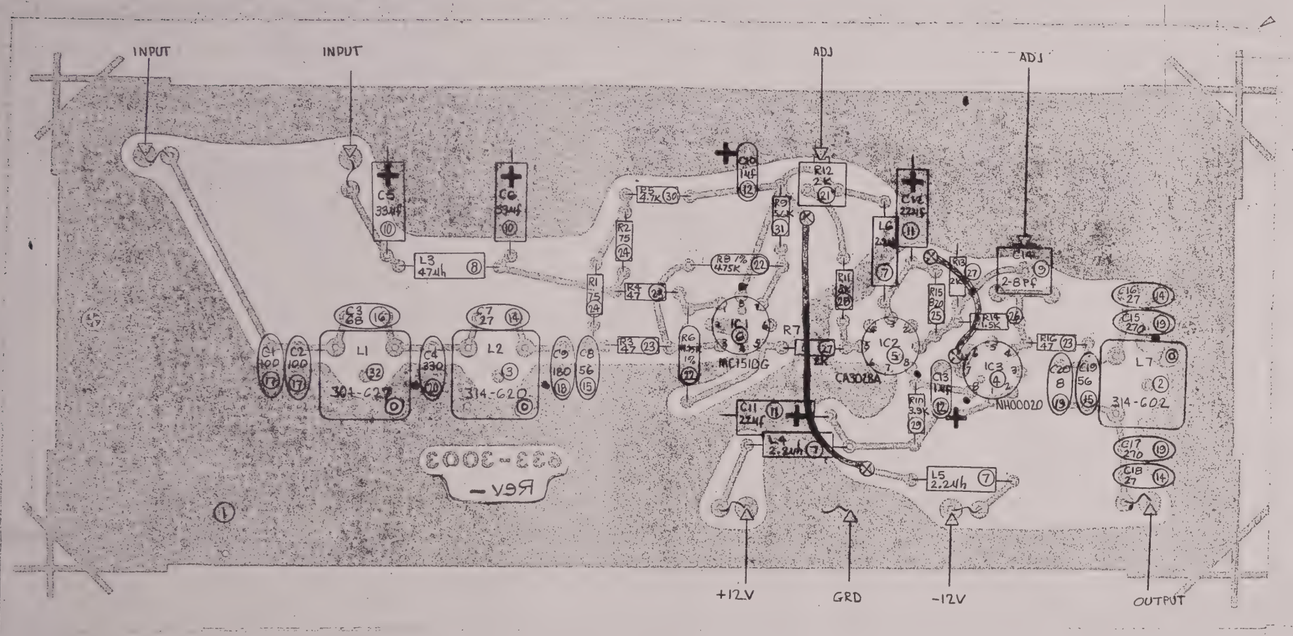
1. Capacitor values in decimal numbers are in microfarads.
2. Capacitor values in whole numbers are in picofarads.
3. All resistor values are in ohms.
4. All inductor values are in microhenries.
5. ▷ 2500 pf feed-thru capacitor mounted on metal enclosure.
6. * Factory selected component value.

FUNCTIONAL SCHEMATIC DIAGRAM

OUTPUT MIXER

DRAWING NO 633-1002 REV a

FLUKE JOHN FLUKE MFG CO., INC.
P O Box 7428 Seattle Washington 98133



NOTES:

1. (•) INDICATES CLOCKING
2. ⊗ - SOLDER FEEDTHRU WIRES BOTH SIDES BEFORE INSTALLING COMPONENTS

633-4003 SH-OF- REV-

ITEM	P/N	NOMENCLATURE	REF	QTY
1	274621	PCB FAB 633-3003	—	1
2	204834	XFMR 314-602	L7	1
3	204966	" 314-620	L2	1
4	260422	INTEG. CKT NH0002D	IC3	1
5	246236	" " CA3028A	IC2	1
6	260414	" " MC1510G	IC1	1
7	207571	INDUCTOR 2.2uh	L4, L5, L6	3
8	147850	" 47uh	L3	1
9	223955	CAPACITOR-VAR 2-8PF	C14	1
10	182832	" ELEC. 33uF/16V	C5, C6	2
11	182816	" " 22uF/15V	C11, C12	2
12	161919	" " 1uF/35V	C10, C13	2
13	216986	" D.M. 8PF	C20	1
14	177998	" " 27PF	C7, C16, C18	3
15	148528	" " 56PF	C8, C19	2
16	148510	" " 68PF	C3	1
17	148494	" " 100 PF	C1, C2	2
18	148460	" " 180PF	C9	1
19	148452	" " 270 PF	C15, C17	2
20	148445	" " 330PF	C4	1
21	208330	RESISTOR-VAR 2K	R12	1
22	260679	" 1/8W 1% M.F. 4.75K	R6, R8	2
23	147892	" 1/4W 5% 47Ω	R3, R4, R16	3
24	246736	" " " 75Ω	R1, R2	2
25	148015	" " " 820Ω	R15	1
26	148031	" " " 1.5K	R14	1
27	202879	" " " 2K	R7 & R13	2
28	193508	" " 3K	R11	1
29	148064	" " " 3.9K	R10	1
30	148072	" " " 4.7K	R5	1
31	148080	" " " 5.6K	R9	1
32	173112	XFMR 304-627	L1	1

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
	-	RELEASE FOR PROD			

FLUKE JOHN FLUKE MFG CO., INC.
P.O. BOX 7428, SEATTLE, WN.

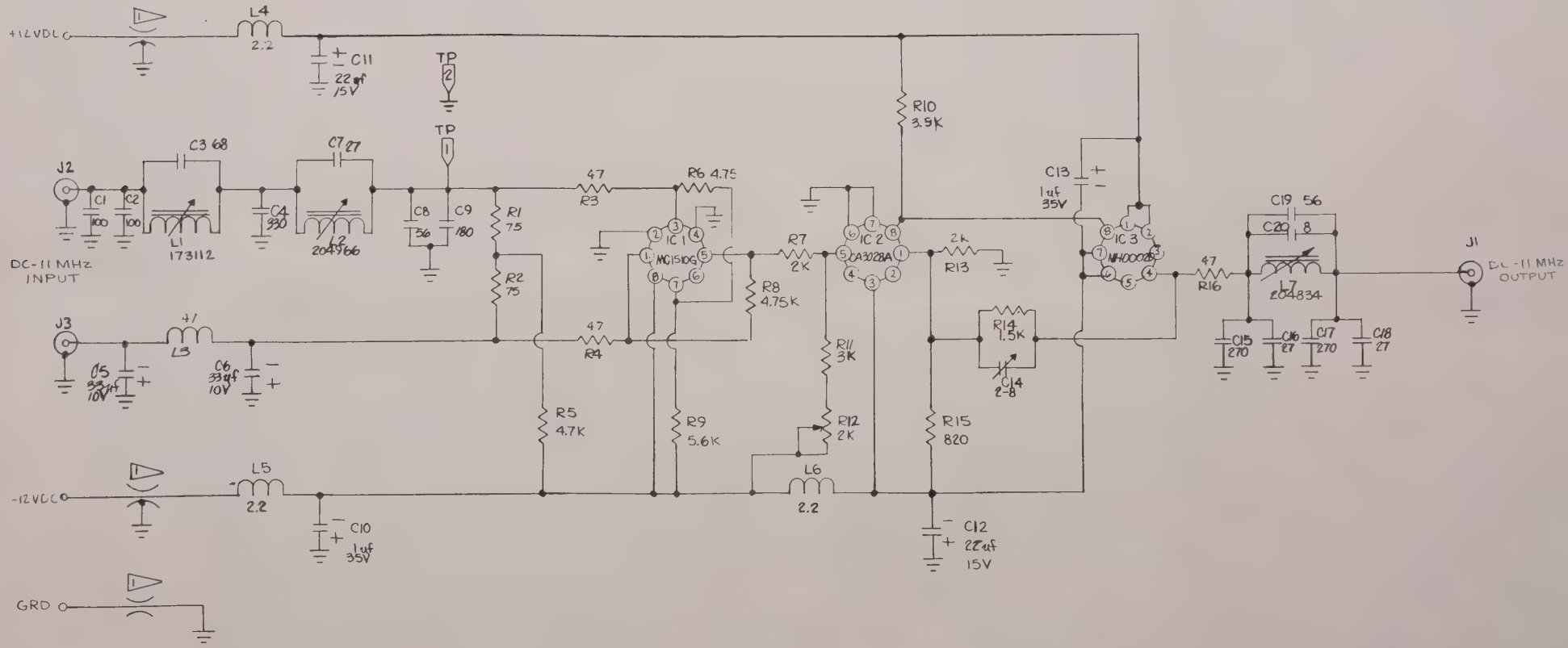
UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

DO NOT SCALE DRAWING
DFTM K. THOMPSON 5-14-9
PROJ ENG [illegible] 5-20-9
MFG ENG [illegible] 5-30-64
MATERIAL: —
FINISH: —

OUTPUT AMPLIFIER
COMPONENT ASSEMBLY

PART NO	SIZE	DRAWING NUMBER
274647	D	633-4003

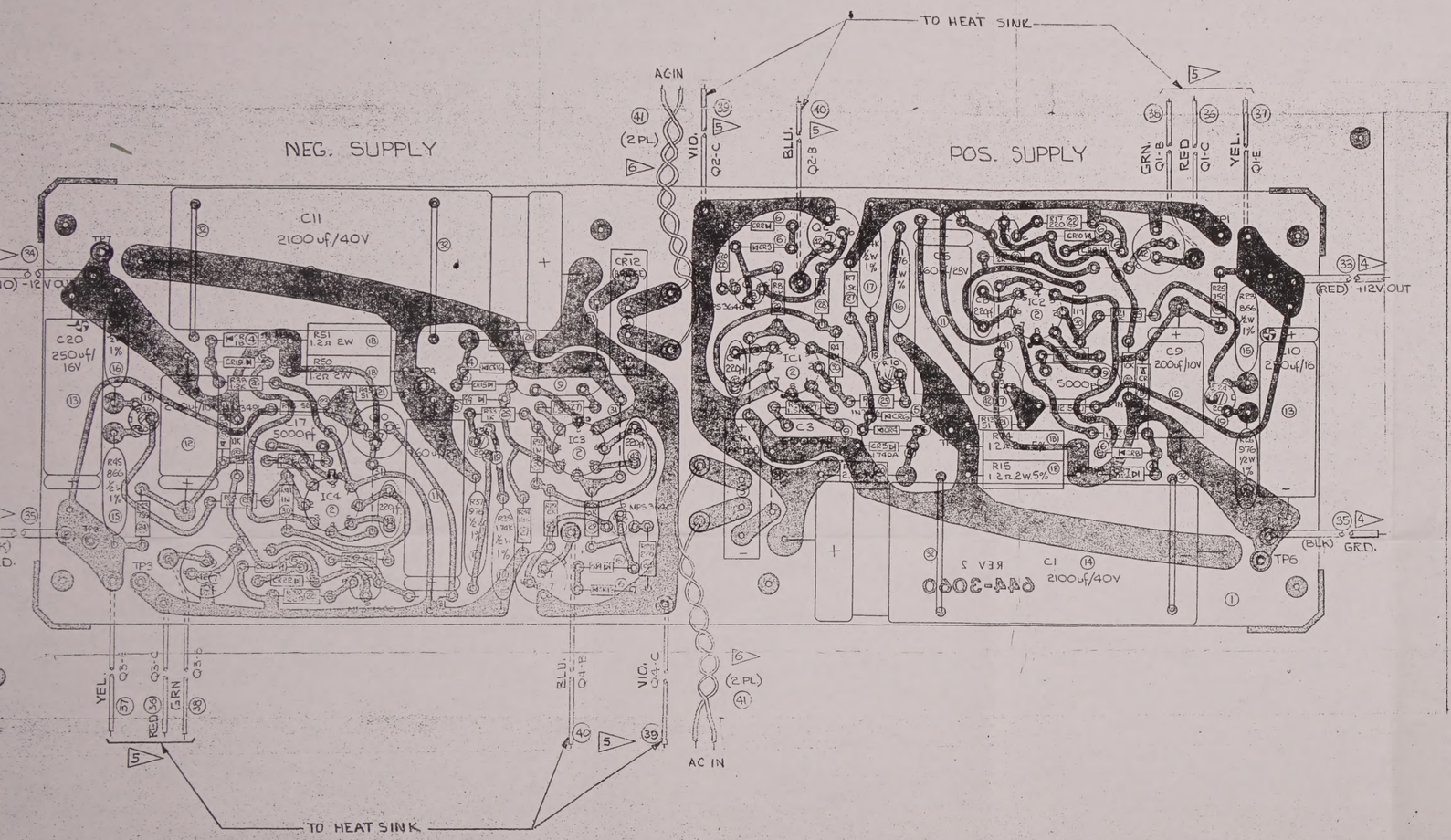
SCALE 2X SHEET — OF — REV —
DIST



NOTES:

1. Capacitor values in decimal numbers are in microfarads.
2. Capacitor values in whole numbers are in picofarads.
3. All resistor values are in ohms.
4. All inductor values are in microhenries.
5. ▷ 2500 pf feed-thru capacitor mounted on metal enclosure.
6. * Factory selected component value.

FUNCTIONAL SCHEMATIC DIAGRAM	
OUTPUT AMPLIFIER	
DRAWING NO 633-1003	REV a
FLUKE JOHN FLUKE MFG. CO., INC. P O Box 7428 Seattle, Washington 98133	



NOTES:

1. CR2,3,4,8,9,10,13,14,15,19,21,22
2. C3. 7, 12, 17.
3. R5, 7, 20, 31, 34, 52
4. SOLDER 15" LENGTH OF WIRE TO TERMINAL AS SHOWN
5. SOLDER 7" LENGTH OF WIRE TO TERMINALS AS SHOWN & DIRECT TOWARDS CENTER OF BD.
6. TWIST 2 12" LENGTHS OF (41) & SOLDER TO TERMINALS AS SHOWN
7. SOLDER 20" LENGTH OF WIRE TO TERM. AS SHOWN.
8. DOT (●) INDICATES CLOCKING OF PIN 8 AT IC1, IC2, IC3, IC4.

644-4060 SH-OF- REV 5

ITEM	P/N	NOMENCLATURE	REF	QTY
1	251264	PCB FAB 644-3060	---	1
2	246603	INTEGRATED CIRCUIT 709C	IC1 → IC4	4
3	230547	DIODE BRIDGE	CR1,12	2
4	180455	DIODE 1N749A	CR5,7,16,18	4
5	172148	" 1N3496	CR6,11,17,20	4
6	203323	"	1	12
7	203489	TRANSISTOR	Q2,3,5,7,9,10	6
8	226290	" MPS3640	Q1,4,6,8	4
9	~~181055~~ 181057	CAPACITOR - ~~5%~~ 5000pf ~~100pf~~	2	4
10	~~135378~~	" " ~~150pf~~	~~C2,6,14,18~~	~~4~~
11	236901	" -Elec. 160uf/25V	C5,15	2
12	236935	" " 200uf/10V	C9,19	2
13	187765	" " 250uf/16V	C10,20	2
14	248666	" " 2100uf/40V	C1,11	2
15	151233	RESISTOR - MF 1/2W 1% 866Ω	R23,45	2
16	246157	" " " " 976Ω	R11,26,37,47	4
17	245647	" " " "1.74KΩ	R9,35	2
18	248658	" - WW 2W 5% 1.2Ω	R14,15,50,51	4
19	226050	" - VARIABLE 200Ω	R10,24,36,46	4
20	100506	" - 1/2W 5% 2.2KΩ	R1,27	2
21	221879	" - 1/4W 5% 51Ω	R13,49	2
22	147959	" " " 220Ω	R2,17,28,39	4
23	147991	" " " 560Ω	R12,48	2
24	218026	" " " 750Ω	R25,43	2
25	148023	" " " 1KΩ	R6,21,33,44	4
26	190371	" " " 1.2KΩ	R16,38	2
27	148031	" " " 1.5KΩ	3	6
28	202879	" " " 2KΩ	R3,18,29,40	4
29	148049	" " " 10KΩ	R8,22,30,42	4
30	182204	" " " 1MΩ	R4,19,32,41	4
31	115469	BUS WIRE #22 AWG	---	1Ft
32	184796	HOUSEHOLD	---	4
33	35517	WIRE #18 AWG PVC RED	—	2 FT
34	135533	" " " " VIO	—	2 FT
35	135541	" " " " BLK	—	2 FT
36	115576	" #22 AWG TEF RED	—	2 FT
37	115584	" " " " YEL	—	2 FT
38	115592	" " " " GRN	—	2 FT
39	115808	" " " " VIO	—	2 FT
40	115675	" " " " BLU	—	2 FT
41	115782	" " " " BRN	—	5 FT
42	152207	TRANSIPAD	—	6
43	170423	CAPACITOR 220pf	C4,8,13,16	4

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
	5	SWITCHED POS & NEG SUPPLY GRD WAS -12V AT TP6, +12V AT TP8. ADDED WIRE COLORS & NOTE 8	PC 6-12-69		
C3	4	REV 4 WIRE LENGTH WAS 10"	PC 5-8-69		
—	3	PRODUCTION RELEASE	PR 5-2-69		
—	3	CHANGED VALUES C3, 4, 7, 8, 12, 13, 16 & 17 FROM 100pf. DELETED C2, 6, 14, & 18.	JCF 2/6/69		
—	2	ADDED REF INFO TO WIRES	L.L. 12-18-68		
—	1	REVISED	9-16-68		

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2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

DO NOT SCALE DRAWING

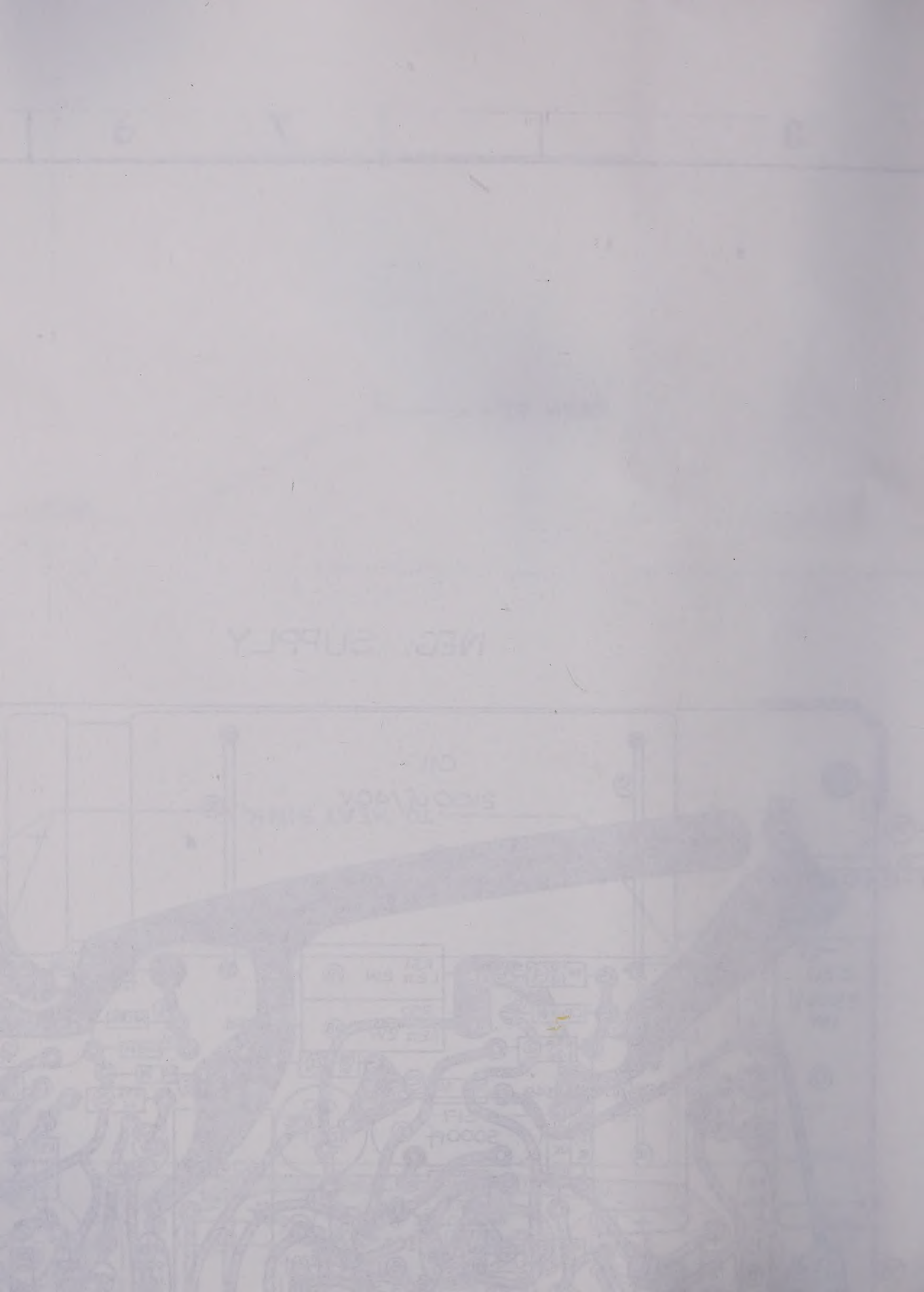
DFTM K. THOMPSON 6-30-5
PROJ ENG R. [illegible] 9-16-8
MFG ENG D. [illegible] 18 Sept 68
MATERIAL: —
FINISH: —

POWER SUPPLY COMPONENT ASSEMBLY

PART NO	SIZE	DRAWING NUMBER
253773	D	644-4060

SCALE 2X SHEET — OF — REV 5

DIST CUST



644-1060 SH-OF- REV 4

LOCATED ON REAR PANEL

T1

(ORN)

(WHT/RED)

S2

(RED)

(BRN)

(WHT/BRN)

645A-6510

P1

(WHT)

(BLK)

(RED)

CR1

CR12

TP1

TP2

TP3

TP4

TP5

TP6

TP7

TP8

4025I Q2

4025I Q4

4025I Q1

4025I Q3

Q7

Q6

Q8

Q5

Q9

Q10

MPS3640 Q1

MPS3640 Q4

MPS3640 Q6

MPS3640 Q8

R1 2.2K 1/2W

R2 220

R3 2K

R8 10K

R9 1.74K 1/2W 1%

R10 200

R16 1.2K

R17 220

R18 2K

R22 10K

R23 866 1/2W 1%

R24 200

R25 750

R26 376 1/2W 1%

R12 560

R13 51

R14 1.2Ω 5% 2W

R15 1.2Ω 5% 2W

R27 2.2K 1/2W

R28 220

R29 2K

R30 10K

R35 1.74K 1/2W 1%

R36 200

R38 1.2K

R39 220

R40 2K

R42 10K

R43 750

R44 1K

R45 866 1/2W 1%

R46 200

R47 376 1/2W 1%

R48 560

R49 51

R50 1.2Ω 5% 2W

R51 1.2Ω 5% 2W

R31 1.5K

R32 1M

R33 1K

R34 1.5K

R37 376 1/2W 1%

R41 1M

R52 1.5K

R4 1M

R5 1.5K

R6 1K

R7 1.5K

R11 376 1/2W 1%

R12 1M

R20 1.5K

R21 1K

C1 2100uf 40V

C2 5000

C3 5000

C4 220

C5 160uF 25V

C7 5000

C8 220

C9 200uF 10V

C10 250uF 16V

C11 2100uf 40V

C12 5000

C13 220

C15 160uF 25V

C16 220

C17 5000

C19 200uF 10V

C20 250uF 16V

IC1 709C

IC2 709C

IC3 709C

IC4 709C

CR2

CR3

CR4

CR5 IN749A

CR6 IN3496

CR7 IN749A

CR8

CR9

CR10

CR11 IN3496

CR13

CR14

CR15

CR16 IN749A

CR17 IN3496

CR18 IN749A

CR19

CR20 IN3496

CR21

CR22

(RED) +12V

(BLK) GRD.

(BLK) GRD.

(V10) -12V

POSITIVE SUPPLY

NEGATIVE SUPPLY

NOTES:

1. LOCATED ON PWR SUPPLY HEAT SINK
2. SWITCH VIEWED FROM SHAFT END AT MAX CCW POS. 100-115-200-230VAC

1. ALL RESISTORS 1/4W 5% UNLESS NOTED
2. ALL CAPACITOR VALUES IN PF UNLESS NOTED
3. ALL TRANSISTORS ARE 2N3485 UNLESS NOTED

LAST # USED
R52
C20
CR22

ZONE	REV	DESCRIPTION	DWN	CKD	APPD
C7,8, B&13, C&D-1	4	IDENTIFIED P1, S2, T1. BLK WIRES FROM PWR SUPPLY WERE -12VE +12V SHIELD FROM MISC SUPPLY	PC 6-5 6-6	6-27	6-27 6-29
—	3	PRODUCTION RELEASE	DK 9/23/9	BS	9/24/9
—	3	CHANGED VALUES C3,C7,C12,C17, C4,C8,C13 & C16 FROM 100 pf. DELETED C2,C6,C14 & C18.	J.C.F 2/4/80		
—	2	ADD WIRE COLORS & REF DESIGN.	L.L.	12-19	5-84
—	1	REVISED			

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2 PLACE DECIMALS ± .02
FRACTIONS ±
ANGLES ± X CONST.

DO NOT SCALE DRAWING

DFTM K. THOMPSON 6-28-8
PROJ ENG R. Stell 9-15-8
MFG ENG D. Thym 10/1/87
MATERIAL: —
FINISH: —

POWER SUPPLY (SCHEMATIC)

PART NO	SIZE	DRAWING NUMBER
—	D	644-1060

SCALE — SHEET — OF — REV 4

DIST 10